Controlling Wheel Slip

...page 32

French Electrification

...page 38

RAILWAY

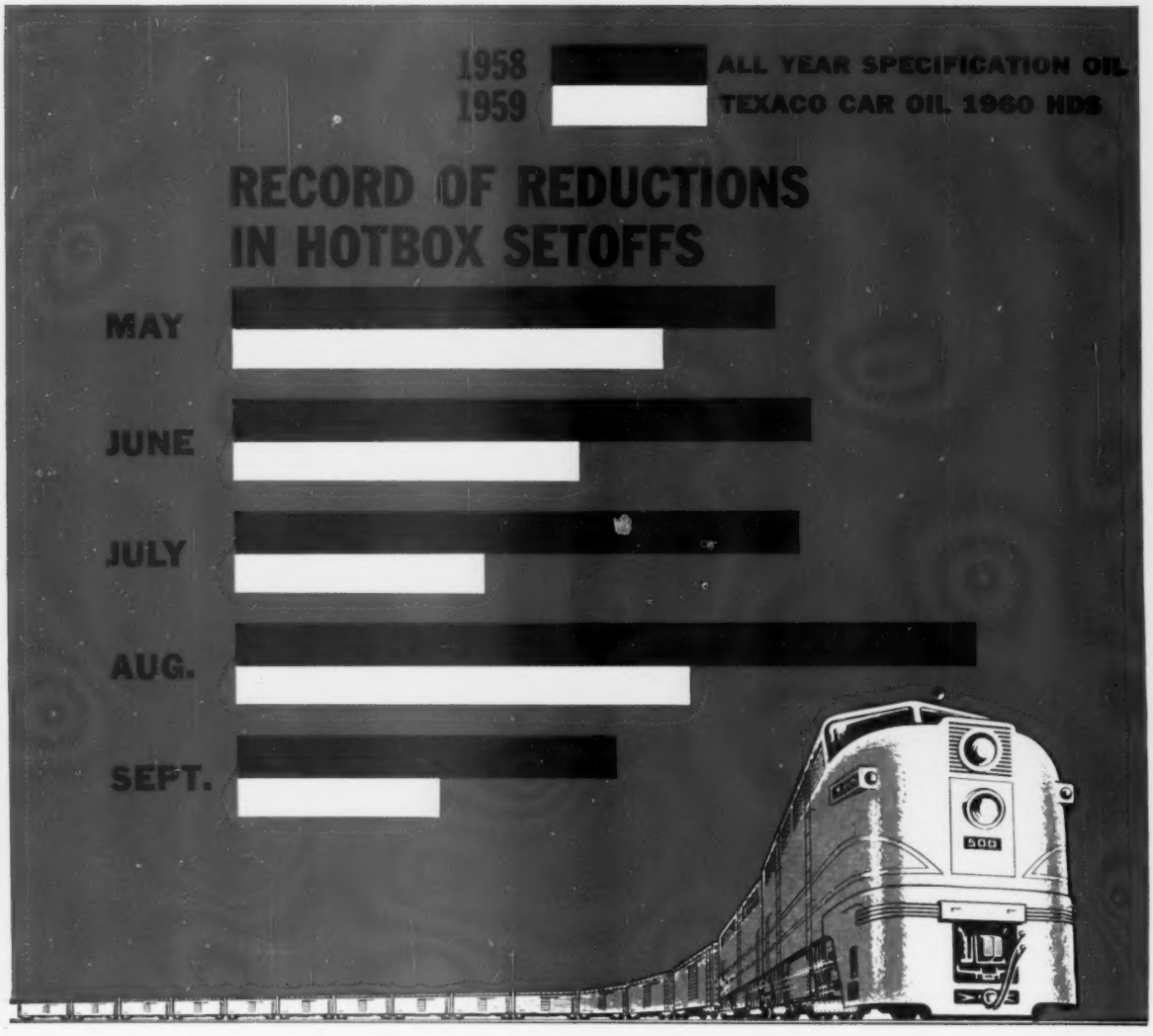
LOCOMOTIVES AND CARS

A SIMMONS-BOARDMAN TIME-SAVER PUBLICATION

MAY 1960

COMP
EDITORIAL DEPT
UNIV MICROFILMS INC
313 N FIRST ST
ANN ARBOR MICH

Seaboard Checks for Journal Flaws ... page 21



How Texaco helped achieve

40% FEWER HOTBOX SETOFFS

The figures graphed above show that it pays to use a premium, summer grade car oil for your free oiling. In the case cited, note the vastly improved performance with Texaco Car Oil 1960 HDS as compared with the previously used all-year specification oil.

The graph is based on records of a busy yard handling some 100,000 cars a month. During the 5-month period, May through September, 1959, more cars were handled than in the same period in 1958, yet, with Texaco, there were *40% fewer setoffs charged against the yard!*

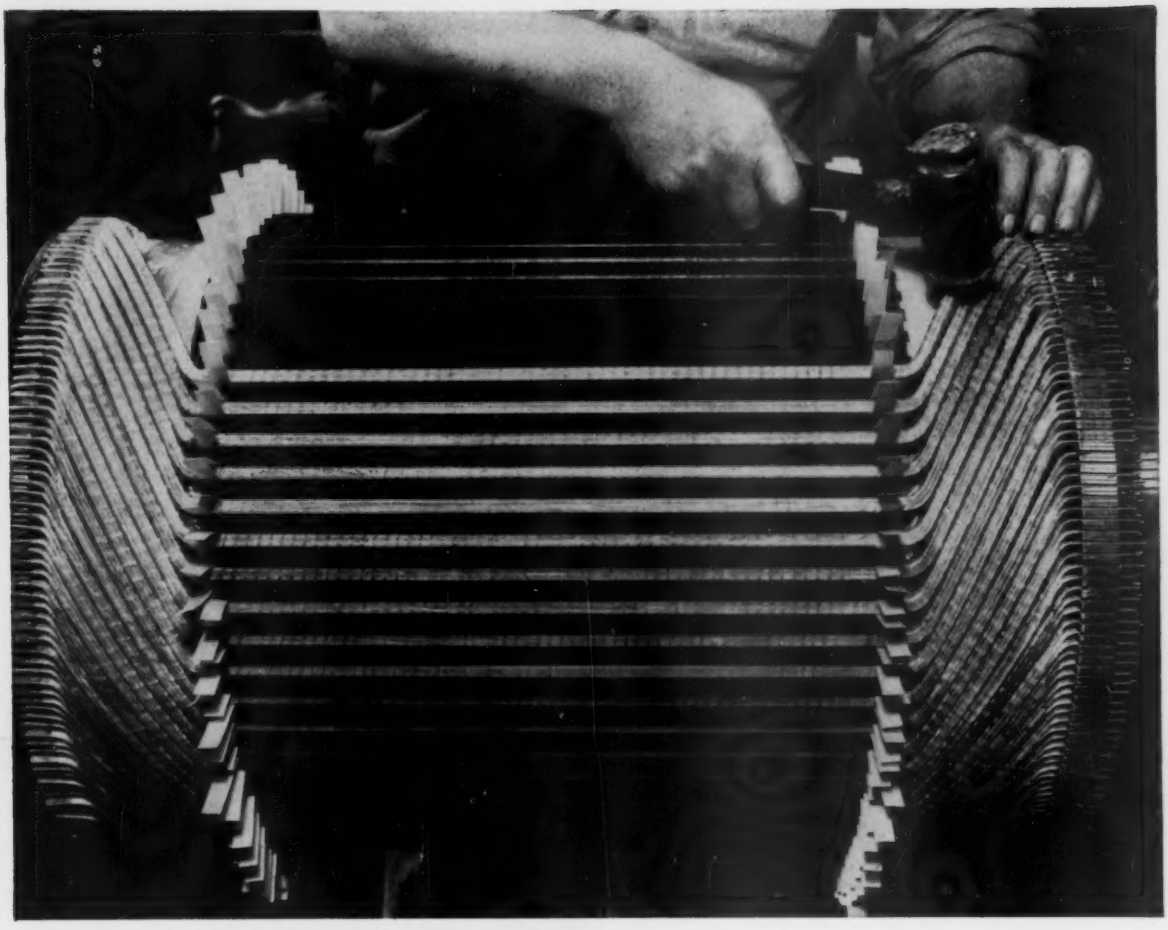
Texaco Car Oil 1960 HDS is specially formulated for summer use, has been extensively proved in road service. Act now to reduce *your* hotbox setouts this summer. Call the nearest Texaco Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. Texaco Inc., *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.

TUNE IN: Texaco Huntley-Brinkley Report, Mon. through Fri. NBC-TV

TEXACO

Throughout the United States
Canada • Latin America • West Africa

RAILROAD LUBRICANTS AND SYSTEMATIC ENGINEERING SERVICE



NEW NECCOBOND* ARMATURE COIL

adds life to traction motors...cuts rewind time

NECCOBOND is National Electric Coil's name for a new and improved insulation system developed in its own laboratories. Neccobond has been applied to traction armature coils offering these advantages:

Cooler operation, due to rapid heat transfer from void-free insulation.

Greater wear-resistance, due to high mechanical strength.

Excellent moisture resistance, because of complete encapsulation.

Easier, faster winding, due to a high degree of uniformity.

Call in your nearby National Electric Coil field engineer for complete information, then order a trial quantity of Neccobond armature coils. Prove to your own satisfaction that these coils add life to your traction motors... cut rewind time... save money!

***Neccobond** armature coils are insulated with mica and glass, pre-impregnated with a catalytic-type, high temperature resin. Controlled curing then produces an insulating wall with markedly improved characteristics.

McGRAW EDISON

NATIONAL COILS

National Electric Coil

DIVISION OF McGRAW-EDISON COMPANY

COLUMBUS 16, OHIO

ELECTRICAL ENGINEERS • MANUFACTURERS OF ELECTRICAL COILS, INSULATION, LIFTING MAGNETS • REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

to make the
long hauls trouble-free
use

WIKIT*

JOURNAL LUBRICATORS

. . . so advanced, no changes needed to meet new journal lubricator specifications

. . . the quality lubricator—designed to provide continuous lubrication of journals under toughest usage and all weather conditions

• **Original center wick construction**—provides most direct oil flow to journal. Over-all design assures multi-feed wicking throughout lubricator.

• **LOOP-TITE* jacket**—woven by a patented process, interlocks loop pile in a weave that gives greater tensile strength, more direct oil delivery.

• **ABSORBenized***—WIKIT jackets are specially treated—like famous Callaway bath towels—to assure greatest absorbency, fastest wicking.

• **Quality construction**—with premium materials—makes WIKIT a *quality product* . . . made to last!

• **AAR-Approved** for Test Application in Interchange Service!

• **No. 11 WIKIT** absorbs and retains 7 pints of oil—after saturation and draining 3 hours. Nylon tape secures non-ferrous pull handles to lubricator ends—over 500 pounds tensile strength. Cores are quality neoprene foam . . . resistant to weather, oil, heat, compression set. Easily installed . . . either side up, either end first. Easily cleaned . . . remains stable in renovation.

*Callaway Mills trademarks

GET WIKIT—THE QUALITY LUBRICATOR!

CALLAWAY MILLS
REG. U.S. PAT. OFF.

CALLAWAY MILLS, INC.
295 FIFTH AVENUE • NEW YORK 16, N. Y.

Representatives in New York • Philadelphia • Cleveland • Chicago
St. Paul • San Francisco • San Antonio • Louisville • Montreal

RAILWAY
LOCO-MOTIVES AND CARS

America's Oldest Trade Paper

May 1960—Vol. 134, No. 5

Editorial and Executive Offices:
30 Church Street, New York 7

C. L. Combes
Editor, New York

F. N. Houser
Managing Editor, New York

Norman E. Gillespie
Western Editor, Chicago

A. G. Oehler
Consulting Editor, New York

Lillian D. Milner
Editorial Assistant, New York

•

Robert G. Lewis
Publisher, New York
Duane C. Salisbury
Director of Sales, New York
Joseph J. Menkes
Production Manager, New York

•

BRANCH OFFICES: 79 West Monroe st., Chicago 3; 1081 National Press Bldg., Washington 4, D.C.; 1501 Euclid ave., Cleveland 15; 1336 Wilshire Blvd., Los Angeles 17; Suite 203, Carlton House, Pittsburgh 19; 214 Terminal Sales Bldg., Portland 5, Ore.; 244 California st., San Francisco 11; 3908 Lemmon ave., Dallas 19, Tex.

FOREIGN REPRESENTATIVES: Sibley-Field Publishing Company, Ltd. 8/9 Clerkenwell Green, London E. C. I. England; Georg J. Linder, (16) Frankfurt a. Main, Wittelsbacher Allee 60, West Germany.

•

Railway Locomotives and Cars is a member of the Audit Bureau of Circulation (A.B.C.) and is indexed by the Engineering Index Service. Printed in U.S.A.

Published monthly by the Simmons-Boardman Publishing Corporation, 10 W. 23rd St., Bayonne, N. J., with editorial and executive offices at 30 Church St., New York 7. James G. Lyne, Chairman of the Board; Arthur J. McGinnis, President and Treasurer; Duane C. Salisbury, Exec. Vice Pres.; George Dusenbury, Vice-Pres. and Editorial and Promotional Director; M. J. Figa, Vice Pres. and Director of Production.

•

CIRCULATION DEPARTMENT: **R. C. Van Ness, Director of Circulation, 30 Church st., New York 7.** Re-entry of second class privileges authorized at Newark, N. J., with additional second class privileges, Bristol, Conn. Subscription price to railroad employees only in U.S. possessions and Canada, $2 one year, $3 two years, payable in advance. Subscription price to railroad employees elsewhere, $8 per year. Single copies, 75¢. Address all subscriptions and correspondence concerning them to: Subscription Department, Railway Locomotives and Cars, Emmett st., Bristol, Conn. Changes of address should reach us three weeks in advance of the next issue date. Send old address with the new, enclosing, if possible, your address label. The Post Office will not forward copies unless you provide extra postage. Duplicate copies cannot be sent.

POSTMASTER—SEND FORM 3579 TO EMMETT ST., BRISTOL, CONN.

REPORT FOR MAY

Aluminum Covered Hopper Without Center Sill

"Hopped tank car" is one designation applied to a tubular body aluminum covered hopper developed by engineers of Canadian National and Aluminum Co. of Canada. Tank-style body makes it unneccessary to have side posts, crossbearers, and a portion of the center sill between bolsters. Longitudinal loads are carried by heavy side sills and the tubular body between bolsters.

Simplified design and smooth interior facilitate unloading and cleaning while making it possible to place discharge gages in most advantageous locations. CNR and Roberval & Saguenay, an Alcan subsidiary, have each ordered two of the 3,000-cu ft, 31,000-lb cars from Marine Industries. Upon delivery, the cars will be subjected to static, impact, fatigue and road test programs. A modular concept, common feature of contemporary architecture, has been applied to this car design. Combinations of a 5-ft module, or basic subdivision of the body, make it possible to produce cars of this design with capacities of 2,500, 3,000 or 3,500 cu ft without substantial redesign or change in production jigs.

Economics of Engine Power Is ASME Conference Topic

The thirty-second Conference and Exhibit of the Oil and Gas Power Division, ASME, will be held at the Muehlebach Hotel, Kansas City, Mo., May 22-26. Economics of Engine Power is to be the conference theme. Paul S. Vaughn of Alco Products, Inc., will discuss the Economics of Engine

(*Continued on page 8*)

Sill-less construction of tubular covered hopper is shown in this model built by CNR.

TIME SAVING IDEAS FOR MAY

MOTIVE POWER AND CAR

Mobile Units Check Freight-Car Axles (Seaboard) 21
Milwaukee One-Spot Running Repairs 23
PRR Ore Hauls Rate Special Cars 25
AAR Research Solves Mechanical Problems 26
Slip Control for High-Power Diesels 32
GN Improves Stencil Cleaning 34
Automated Test Rack Developed for AB Equipment 35

ELECTRICAL

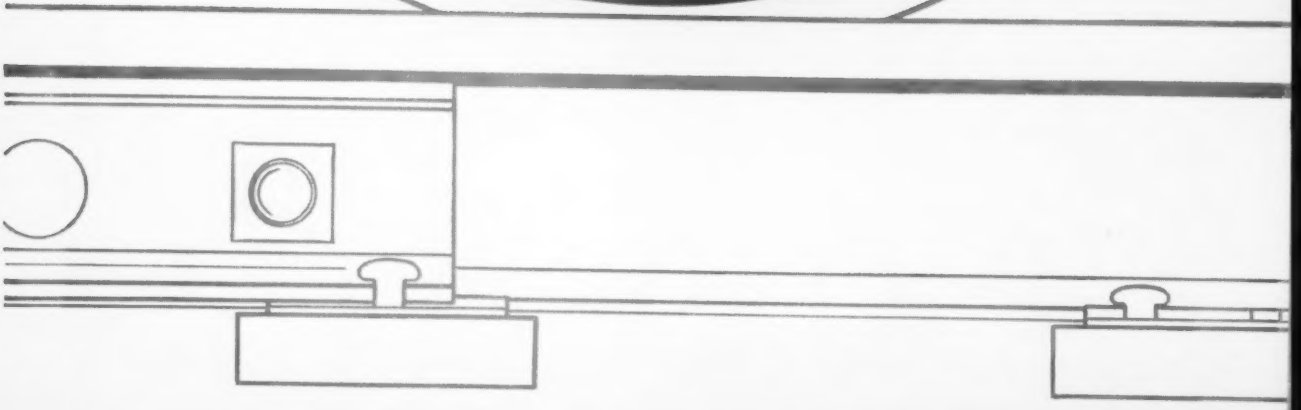
French Choose A-C Electrification 38
Super Power for Super Railroads 40
C&NW 12-Volt Lighting Economical 41
Cures for Spring Fever (Diesel Maintainer's Note Book) 47

DEPARTMENTS

What's New in Equipment 10
Editorials 18
Personal Mention 50
Supply Trade Notes 50

STOP HOTBOX DELAYS

that result from Incorrect Lubrication



USE SINCO® CAR OIL

Premium Grade from

SINCLAIR

Compounded from natural high quality 100 plus V.I. oils, Sinco Car Oil gives you these advantages:

- ☆ All-weather protection – will not congeal in cold weather, nor thin out in heat.
- ☆ More rapid flow through waste or pad – provides instant lubrication.
- ☆ Anti-rust and oxidation-inhibited.

For additional information, write or call Sinclair Refining Company, Railway Sales, 600 Fifth Avenue, New York 20, N. Y.

Sinclair
Railroad
Lubricants

Sinclair

Power Development of the Alco 251 Engine at Session I on Monday, May 24. At Session III on Tuesday, May 24, the following two papers of interest to railroad mechanical men will be presented; Nozzle Design Cuts Locomotive Fuel Costs — Walter J. Gewinner, American Bosch Div., American Bosch Arma Corp.; Design and Development of Turbochargers for the General Motors Series 567 Engines—Albert N. Addie, General Motors Corp.

At Session V on the afternoon of Wednesday, May 25, there will be a panel discussion on Preventive Maintenance of Internal-Combustion Engines by Spectrographic Analysis.

Freight Cars Equipped With Journal Lubricators

Journal lubricators had been applied to 887,020, or 49.9%, of the 1,776,174 railroad-owned revenue freight cars as of Dec. 31, 1959. On that date, 11,089, or 40.3%, of the 275,406 revenue cars under private car ownership were so equipped. Both classifications total 998,109 cars, or 48.6%, of 2,051,580 cars. Similar figures for the years 1954-58 follow.

Period ended	Lubricator equipped	Per Cent of ownership
Railroad-Owned Cars		
12-31-54	4,363	0.2
12-31-55	22,136	1.2
12-31-56	90,582	5.1
6-30-57	173,085	9.8
12-31-57	297,660	16.9
6-30-58	420,522	23.8
12-31-58	552,038	30.6
6-30-59	725,258	40.3
12-31-59	887,020	49.9
Private-Car Owners		
12-31-57	15,067	5.5
6-30-58	24,627	9.0
12-31-58	41,878	15.1
6-30-59	77,379	27.9
12-31-59	111,089	40.3

Compatability, Standardization In Piggyback Future

"Future developments in piggyback equipment, insofar as possible, should be compatible with the equipment already in use," according to John E. Wightman, general manager, Trailer Train Co., who recently discussed the obstacles which, today, challenge any designer trying to build a "universal" car. The goal of TTX in the standardization of rail equipment, particularly piggyback equipment, when it was formed four years ago, was not solely a mechanical one; operating considerations aimed at making interchange practical were also included. In choosing their original equipment, TTX founders established only two fixed principles: (1) cars should be able to carry every type of trailer in general use in the trucking industry, without modification, and (2) cars should be designed for end loading from the standard ramps which have been characteristic of railroading for generations.

That these principles were sound, Mr. Wightman said, is best illustrated by the

(*Continued on page 49*)

Orders and Inquiries for New Equipment

Placed Since the Closing of the April Issue

Diesel-Electric Locomotive Orders

Road and builder	*No. of Units*	*Horsepower and type*	*Detail*
NICKEL PLATE:			
Alco Products	5	1,800	For May-June delivery.
Electro-Motive	10	1,800	For May-June delivery.
NORTHERN PACIFIC:			
Alco Products	6	1,800	RS-18's. Total cost of 15 units in two orders approx. $2,800,000. Deliveries scheduled for June.
Electro-Motive	9	1,800	GP-18's.
SANTA FE:			
Electro-Motive	25	2,000 road switchers	GP-20's to replace 1,350-hp units scheduled for retirement. Deliveries to begin this month.
TEXAS & PACIFIC:			
Electro-Motive	5	1,800 road switchers	GP-18's. Delivery expected this month.

Freight-Car Orders

Road and builder	*No. of Cars*	*Type of car*	*Detail*
ATLANTIC COAST LINE:			
American Car & Fdry.	200	Hopper	70-ton. For Sept. delivery.
	100	Box	50-ton. For Sept. delivery.
CANADIAN NATIONAL:			
Marine Industries	2	Covered hoppers	Aluminum. Experimental tank-shaped body will eliminate side posts, crossbearers, and part of center sill between boltsters. (See p. 5)
	48	Covered hopper	Conventional steel construction. 3,000 cu ft cap.
CLINCHFIELD:			
Pullman-Standard	25	Box	50½-ft, roller-bearing, with 9-ft side doors and DF loaders. Cost, $318,000. For delivery this month.
COLORADO & SOUTHERN:			
General American	10	Covered hopper	70-ton, Airslide.
DETROIT, TOLEDO & IRONTON:			
Greenville Steel Car	120	Hopper	70-ton. Cost, $1,043,400. For June Delivery.
FRISCO:			
Pullman-Standard	400	Box	50-ton, with roller bearings, nailable steel flooring, heavy duty draft gears, ride control and 16-ft plug-type doors. Approx. cost, $5,000,000. Being delivered at rate of 20 cars a day.
	100	Flat	85-ft, tri-level, for auto loading. Cost, approx. $2,500,000. Equipped with roller bearings and for handling 11 standard size autos, or 15 compact cars. Design almost identical to that shown on page 28 of the March issue. Principal difference is reduction in weight of car (110,000 lb for new cars vs 138,000 lb for prototype) made possible by use of high-tensile alloy steel. For July delivery.
LONG ISLAND:			
International Car	6	Cabooses	
MILWAUKEE:			
General American	50	Box	DF, 50-ft, 70-ton. For July delivery.
NORFOLK & WESTERN:			
Pullman-Standard	500	Box	50½-ft. 50 to be equipped with special loading devices. Delivery to begin in July.
NORTH AMERICAN CAR:			
American Car & Fdry	80	Piggyback flat	85-ft, 70-ton. Cost, approx. $1,200,000.
NORTHERN PACIFIC:			
Ortner	25	Gondolas	70-ton. For third quarter delivery.
ROBERVAL & SAGUENAY:			
Marine Industries	2	Covered hopper	Experimental, tank type aluminum, same as 2 cars ordered by Canadian National (above).
SACRAMENTO NORTHERN:			
American Car & Fdry	10	Covered hopper	70-ton, 3,500-cu ft. Equipped with roller bearings. For second quarter delivery.
TRAILER TRAIN:			
American Car & Fdry	400	Piggyback flat	85-ft, roller-bearing.
Pullman-Standard	100	Piggyback flat	85-ft, roller-bearing.
WESTERN PACIFIC:			
General American	4	Covered hopper	70-ton, Airslide, with roller bearings.
Pacific Car & Fdry	200	Box	50-ft, 70-ton, insulated, with roller bearings and 150 to be equipped with PC loader equipment.
Thrall Car	50	Flat	56-ft, 70-ton, with roller bearings.

Notes and Inquiries

General American.—Plans expenditure of approximately $30,000,000 in 1960, primarily for fleet equipment, including tank cars and Dry-Flo and Airslide covered hopper cars.

Great Northern will convert 25 gondolas to handle tin plate coils and similar lading. Cars to be equipped with removable roofs and heavier roller-bearing trucks.

NEW DIOL® RD 79 CRANKCASE OIL HELPS RUN DIESEL ENGINES CLEANER LONGER

See for yourself how clean-running new Diol RD 79 oil is! This piston, from an Electro-Motive diesel in a heavy-duty freight locomotive, has run 200,000 miles without overhaul using new Diol RD 79.

DIOL RD 79 is the latest development in the exceptional line of Diol diesel crankcase oils. It runs even cleaner than Diol RD 77 and 78 oils. The 200,000-mile piston above showed deposits on oil rings as little as half those of pistons run 100,000 miles in similar tests using a reference heavy-duty oil of higher than average quality.

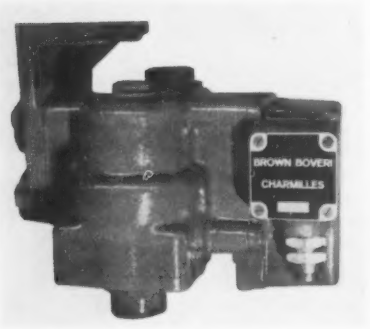
DIOL RD 79 provides outstanding detergency... to reduce sediment build-up in sump lines and coolers; superior oxidation resistance as evidenced by minimum viscosity increase; 45% lower cylinder liner wear; prolonged silver bearing life. Diol RD 79 is non-corrosive to all engine bearing metals and provides reserve alkalinity to combat acids.

For more information or expert technical assistance, write: Esso Standard, Division of Humble Oil & Refining Company, 15 West 51st Street, New York 19, New York.

ESSO

RAILROAD PRODUCTS

In Industry after Industry..."ESSO RESEARCH works wonders with oil"



Anti-Slip Valve

The Brown-Boveri anti-slip valve makes possible control of locomotive wheel slip without sand. A light brake application initiated by the operator or by sensitive wheel-slip detection system can slow a slipping pair of wheels before the inertia has become large. The brake application is made on all wheels and serves to recondition all treads to prevent further slippage.

Tests in U.S. service show that the equipment developed in Switzerland can be successfully used with the heavier masses and series-connected motors which characterize American diesel-electric locomotives. Brake control of wheel slip is automatically initiated on multiple-unit locomotives and can be initiated either automatically or manually on single-unit locomotives. It is equally effective both for low- and high-speed slip.

A brake-cylinder pressure of from 7 to 21 psi can be developed in 0.4 sec and released in a fraction of a second after slipping has stopped. The anti-slip device is installed between the main reservoir and brake cylinders and is supplied with an operating solenoid which is wound for the control circuit of the locomotive to which it is to be applied (usually 74 volts). The valve may also be controlled by air pressure through a self-lapping valve to provide straight-air locomotive braking in the usual manner from the engineman's position. *Railroad Supply & Equipment, Inc., Dept. RLC, Clarks Summit, Pa.*

Filter Cartridge Package

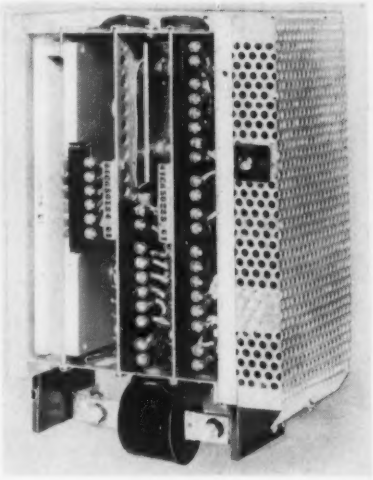
Diesel fuel-oil filter cartridges are now individually packaged in a tough, transparent polyethylene envelope that resists tearing and damage. The wrapper is thermal sealed to prevent any contamination of the prescription filtration cartridge by dust or moisture. With this new packaging, the label is immediately visible, also the all-over appearance of the cartridge. *Wix Corp., Dept. RLC, Gastonia, N.C.*

High-Strength Steel

Armco High Strength No. 5 steel is said to have a corrosion resistance equivalent to copper-bearing mild steel. It meets requirements of SAE Specification 950 and ASTM A-242-55 and can be supplied both in hot-rolled strip and hot-rolled sheet (slit sheets or coils), also in plates. Thicknesses range from .074 to .091 in.; 0972 to .1270 in., and .1271 to .375 in., inclusive, in 50-, 60-, and 72-in. widths, respectively. The steel is said to be practical for railroad cars. *Produc Information Service, Armco Steel Corp., Dept. RLC, Middletown, Ohio.*

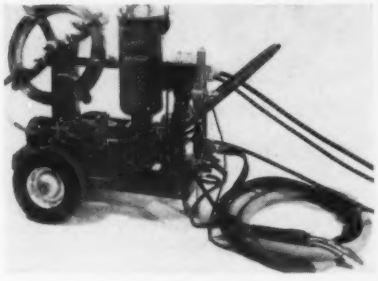
Compressed Air Dryers

Van-Air dryers, both for stationary and mobile air systems, are designed to dry and clean compressed air for all types of pneumatic equipment used in car shops, yards and road work, as well as on diesel locomotives, brake systems, etc. The dryer, located downstream from receiver reservoir, intercepts water and water vapor, along with acid fumes and microscopic solids produced by air compression which are captured by a triple dessicator. The dryer, by reducing vaporous moisture, prevents freezing of air lines and brake valves. It is automatic, needs no regeneration, and uses no power or heat. The capacities of the 33 sizes range from total air for entire shop or yard down to minimal air for smallest instrument or tool. —*Van Products Co., Dept. RLC, 5787 Swanville Road, Erie, Pa.*



Transistorized Voltage Regulator

Electrical components in a new transitorized voltage regulator are card mounted, placing functional circuits on separate, easily removed cards. All electrical connections are made to readily accessible terminals at the front of each card. Contacts and moving parts are eliminated. High frequencies used in the circuit of the regulator avoid flicker in locomotive cab lamps. Where field current up to 12 amp is required, the regulator, it is said, will give long-life performance with any auxiliary generator within the regulator's operating voltage range—66 to 78 volts. A reactor-equipped model has an integral current limiting range of 60 to 360 amp. *Locomotive and Car Equipment Dept., General Electric Co., Dept. RLC, Erie, Pa.*



Magnetic Flux Welding

Carbon dioxide gas acts as a shield around the welding arc of the new Unionarc equipment. The gas also carries a special powdered flux to the torch nozzle. The welding wire is magnetically coated with this flux as it is fed into the arc. Steels up to ½ in.

(Continued on Page 15)

At Last... Simplified

CLAMP-ON AXLE CONTROL

Install AJAX AX-L STOPS in minutes...without truck dismantling!

It's revolutionary! It's the simplest, easiest-to-install axle control! The Ajax AX-L Stop positively controls motion of the journal, wedge and brass on impact and brake application. Lengthens the life of bearings, lubricators, dust guards and seals. Rugged service tests prove that AX-L Stops withstand severe impacts.

The Ajax AX-L Stop clamps securely to the back of the journal box. It is also a dust guard well cover, eliminating the need for sealing or plugging. A whole car set can be installed *in less than 20 minutes! No* truck dismantling, *no* drilling or welding, *no* disturbance of other truck parts! *Nothing* goes inside of the journal box! AX-L Stop controls at the dust guard, or dry seat, and positively *cannot* score or wear the journal.

Get desirable *axle control* the easy, inexpensive Ajax way.

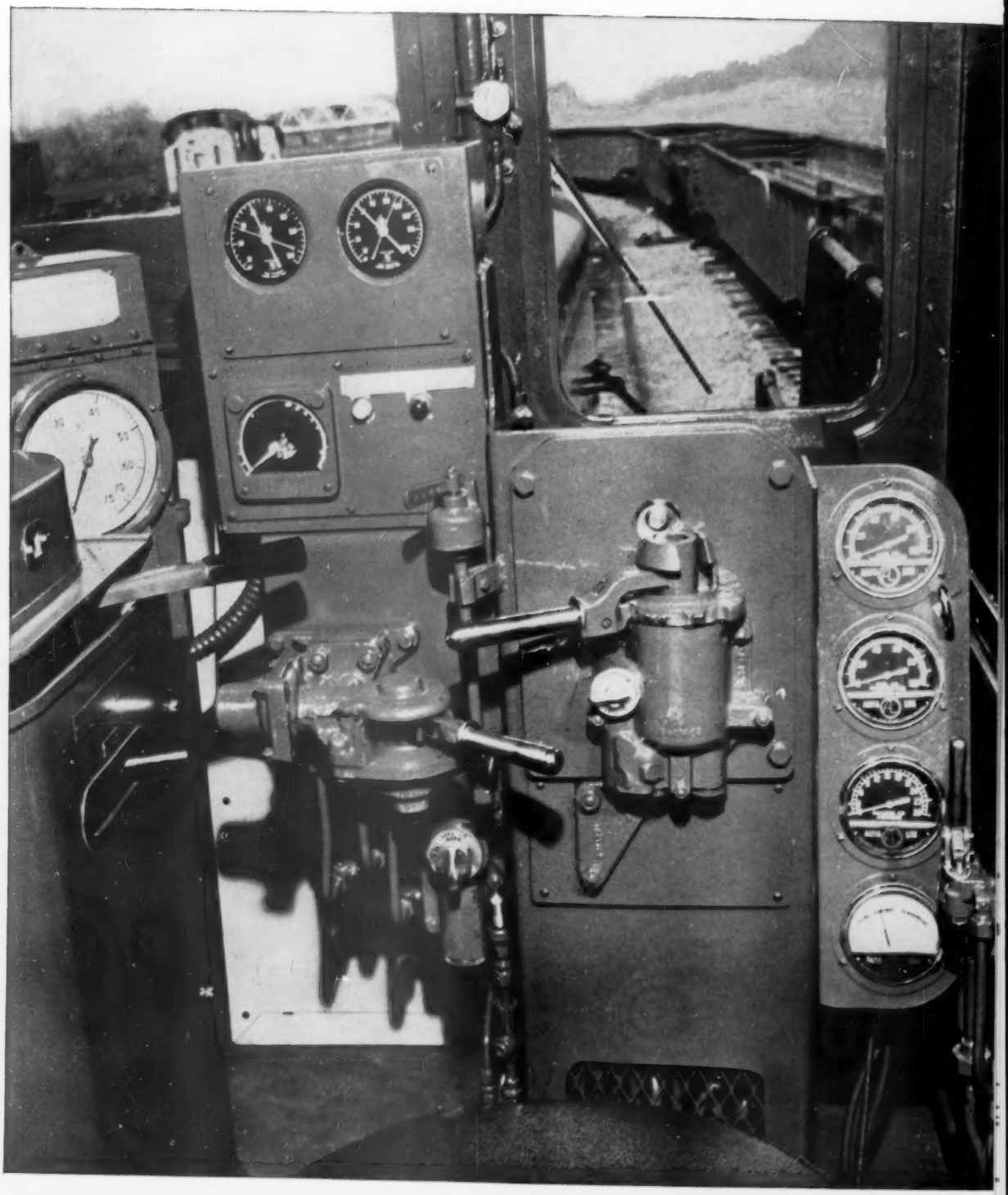
A. A. R. Approved for Limited Application in Interchange Service

GEARED TO PROGRESS
RPI MEMBER

AJAX AX-L STOPS

AJAX-CONSOLIDATED COMPANY • Div. of Southern Electric, Inc. • 4615 W. 20th St., Chicago 50, Ill.

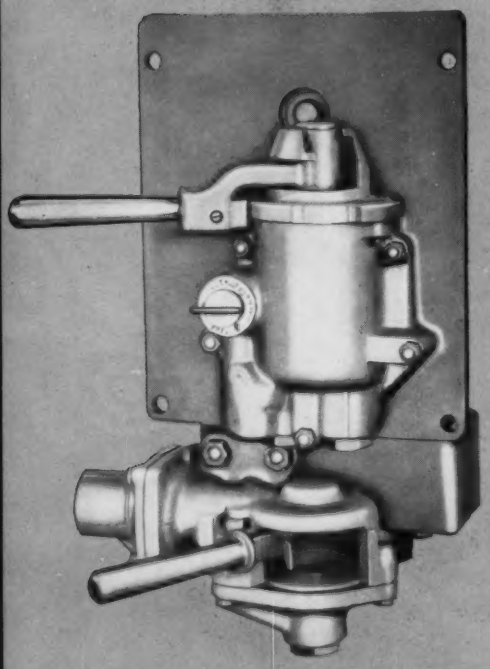
This is the new 26-L LOCOMOTIVE



BRAKE for the *crowded* space age

Smaller Package Makes Neat Cab

Panel or shelf-mounting occupies small cab area. Or, as shown in cab view, portions can be mounted separately.



Valvular parts are concealed behind panel. Piping reduced and concealed.

The new Westinghouse 26-L locomotive brake is so compact and light that it's just right wherever space and weight are at a premium. *Ask the man in the cab!*

But, space-saving is merely a convenience. The big advantages of this new, *advanced* brake are its light weight and simplicity of design. 26-L has no rotary valves. 26-L has no rings or ring type pistons. 26-L has no slide valves. *And maintenance time and costs have been reduced to a minimum through the elimination of skilled hand fitting of metallic rings and slide valves!*

Yet, even as small as it is, the compact 26-L is fully as efficient and fully as dependable as the larger and heavier equipment which has long been the accepted standard. The new 26-L brake operates in complete harmony with existing types of freight and passenger locomotive equipment in service today.

Any way you figure it, the new 26-L locomotive brake is a good investment. Its performance has been proven in actual service on approximately 2,000 locomotives now operating. Lower initial and maintenance costs, plus such modern features as pressure maintaining, warrant consideration in locomotive modernization programs. If you have not already looked into this advanced equipment, ask for detailed information today.

Westinghouse Air Brake COMPANY

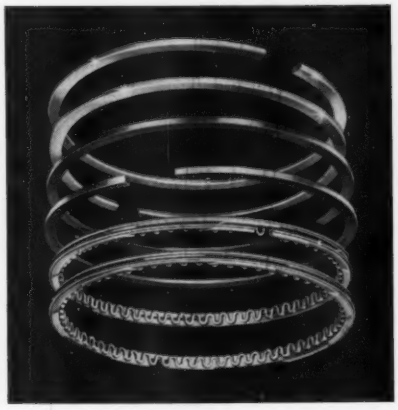
Air Brake Division — Wilmerding, Pennsylvania

SUCCESS DEPENDS ON "TEAMWORK"

Teamwork is essential to success in baseball. For the most successful performance, the various piston rings on any particular piston also must work together as a "team." Properly selected, the best combination of rings will control blow-by, lubricate effectively without oil waste, seal compression and provide full power and long life.

This kind of piston-ring "team work" is what you get when you use Pedrick Engineered Sets. Backed by 40 years' experience in engineering correct combinations of rings for particular engines, Pedrick Engineered Sets, in single-cylinder units for big-bore engines, offer the very best performance which can be obtained with the very latest development in ring designs. Engineered Sets also simplify handling, ordering and inventory.

For engineered sets or open-stock rings, or for help on special problems, you can depend on the best from PEDRICK. Write, wire or phone: WILKENING MANUFACTURING CO., Philadelphia 42, Pa. Saratoga 9-3770. *In Canada:* Wilkening Manufacturing Co. (Canada) Ltd., Toronto 2.



A "Team" of Pedrick Rings... An Engineered Set For a Large Diameter Engine.

Pedrick PISTON RINGS

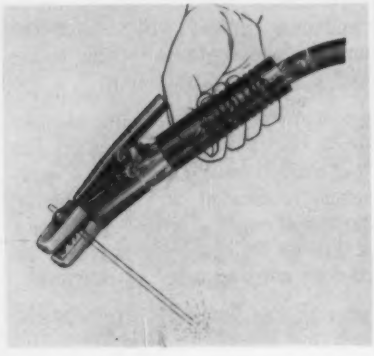
PEDRICK PIONEERED *Conformable* RINGS IN ENGINEERED SETS FOR BIG-BORE ENGINES

WHAT'S NEW IN EQUIPMENT—(Continued from page 10)

can be welded in one pass. Welding is continuous, with no stopping to change electrodes. A 12-in. diameter coil of welding wire is carried on the rubber-tired wheeled cart. Pistol-type and blowpipe-type torches are available. *Linde Co., Div. of Union Carbide Corp., Dept. RLC, 30 East 42nd st., New York 17.*

Twin Electrode Torch

The Model B-3 twin-electrode torch, for use with any a-c welding machine, uses two cored carbon electrodes to produce an electric arc for many heating, soldering, brazing and welding jobs. No gas is involved. *Arcair Co., Dept. RLC, P.O. Box 431, Lancaster, Ohio.*



Air Cooled Electrode Holder

The KoolGrip air-cooled electrode holder for heavy-duty metallic arc welding will hold electrodes through ⅜ in. diameter and is rated 600 amp at 40 volts and 60 per cent duty cycle. The unit is said to permit an operator to weld a full shift without changing holders and to eliminate the hazards of water cooling.

Air at low pressure flowing from perforations in the handle cools the holder and the operator's hand. The holder is the lever-action semi-insulated type, with straight jaws as standard equipment. Offset jaws are available on order. The complete unit includes a 6½-ft neoprene-encased cable whip and a Y-Connection with air inlet brazed into a Cam-Lok twist-and-lock electrical connector. *J. B. Nottingham & Co., Dept. RLC, 441 Lexington ave., New York 17.*

Partitioning Device For Refrigerator Cars

A new one-piece, overhead-mounted, steel bulkhead is said to overcome installation problems had with load-bracing equipment. "Cold loss" is eliminated, structual fittings being completely separated from the air and insulated space. The partition can be handled by one man, and sections of the car can be individually locked to prevent load shifting. Each bulkhead is suspended from a single overhead traveling beam, roller mounted on tracks on each side of the car. Each bulkhead also rides on a track in the bottom of the traveling beam which supports it and is pivot mounted in the track. Either bulkhead can be used to brace a load. When not in use, it can be rolled on the overhead side rails to either end of the car and stored. By pivoting it 90 deg during loading, it can be moved to either side of the car on the overhead track in the traveling beam. The bulkheads are locked in position by a single mechanism in the center of each. Perforations in the locking rails are spaced on 2-in. centers. *Railroad Loading Division of Evans Products Co., Dept. RLC, Plymouth, Mich.*

Lettering Kit

Let-R-Set, a pressure sensitive plastic film lettering kit, can be used to prepare and apply lettering to any smooth, clean surface. Desired copy templates are assembled in jig. Templates are then loaded with matching die cut plastic film characters. Pressure on an application carrier automatically transfers the lettering to the carrier, which is then ready for application to the surface to be lettered. The standard size kit contains over 1,000 assorted block style black and white characters; the economy size, over 500. *Demp-Nock Co., Dept. RLC, 21433 Mount Road, Warren, Mich.*

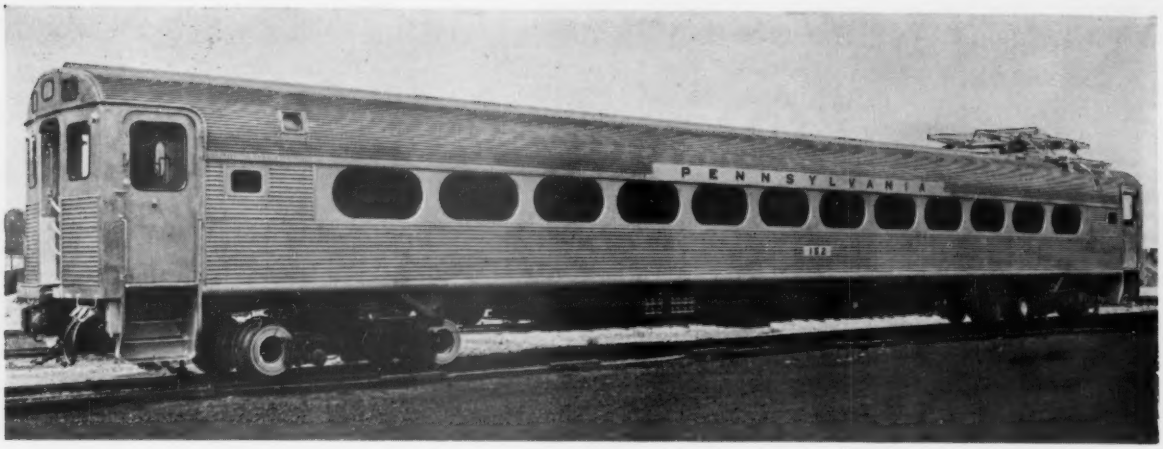
Stop Nuts

The Brilok nut is a one-piece, washer-faced, resilient hexagon composed of du Pont Zytel 101 nylon resin. It is molded to American Standard Flats width dimensions, allowing for use of standard installation and removal tools. The nuts are simultaneously self-tapping, locking, sealing and insulating. They are stocked in ivory white, but are available in colors for coding, identification, or ornamentation. *Pheoll Manufacturing Co., Dept. RLC, 5700 W. Roosevelt Road, Chicago 50.*

Journal Stop

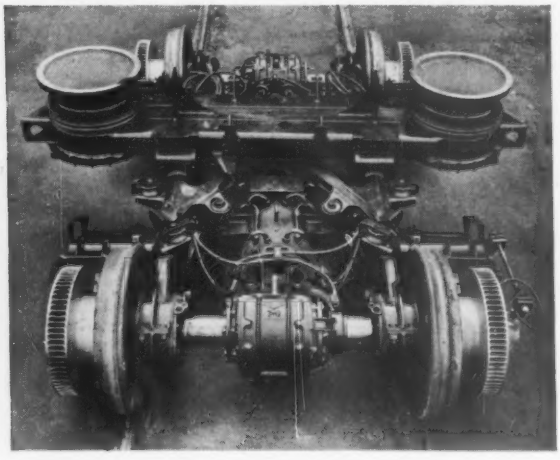
The AX-L stop is a longitudinal stop consisting of two malleable castings, a plug and support and a hanger stop. It is said to positively control the motion of the journal, wedge and brass on impact and brake applications. The plug and support sets on top of the dust guard well and is assembled to the hanger stop with a ½ in. bolt and lock nut. The hanger stop, of maximum 140 Brinell, goes between the wheel hub and back of the journal box. It is 1/16 in. larger in diameter than the axle dust guard seat. The combination of a flange extending over the side of the dust guard well with the bolted connection to the support holds the stop in place. There is no interference with the dust guard well, and it acts as a cover, eliminating sealing. No drilling, welding, truck

(Continued on Page 52)



Spicer Traction Motor Drives Propel The Pennsylvania's Train of Tomorrow

The "Pioneer Suburban", a new 89,300 lb. electric MU car developed by The Budd Company, may prove to be the answer to the Pennsylvania Railroad's challenge for a faster "commuter train of tomorrow." Six of the cars . . . all propelled by Spicer Traction Motor Drives . . . are now serving the Philadelphia suburbs.



Weighing only 23,625 lbs. per pair, Budd Pioneer III type trucks employ two Spicer Traction Motor Drives. These lightweight fabricated trucks have inside frames and bearings and outside disc brakes. Air springs support the car body.

But, it's the compact layout made possible by Spicer Traction Motor Drives that will amaze you! All the cars have inboard frames and bearings and still there's plenty of room to spare. Thus, by employing straight axles, you're free to offset the drive for a multiple gauge design.

Just select the gear ratio . . . from 5.88 to 1 up to 8.9 to 1 . . . that gives you the acceleration you want to match your ideal schedule. Spicer will deliver the complete drive assembly all ready to be secured to the axle without the need of further adjustment.

That means the gears are matched and aligned, then lapped-in under load at the factory . . . to insure the quietest operation for a lifetime of trouble-free service. Finally, the set is lubricated and the housing sealed against leaks. As a result, railway passenger cars equipped with Spicer Drives have traveled up to 1,500,000 miles before needing a major overhaul.

It's simple and easy to use Spicer Traction Motor Drives because you avoid the divided responsibility that comes with a unit that's collectively supplied by a gear manufacturer and a housing fabricator. One call—to the Spicer Service Representative—will bring you the complete help you need and want.

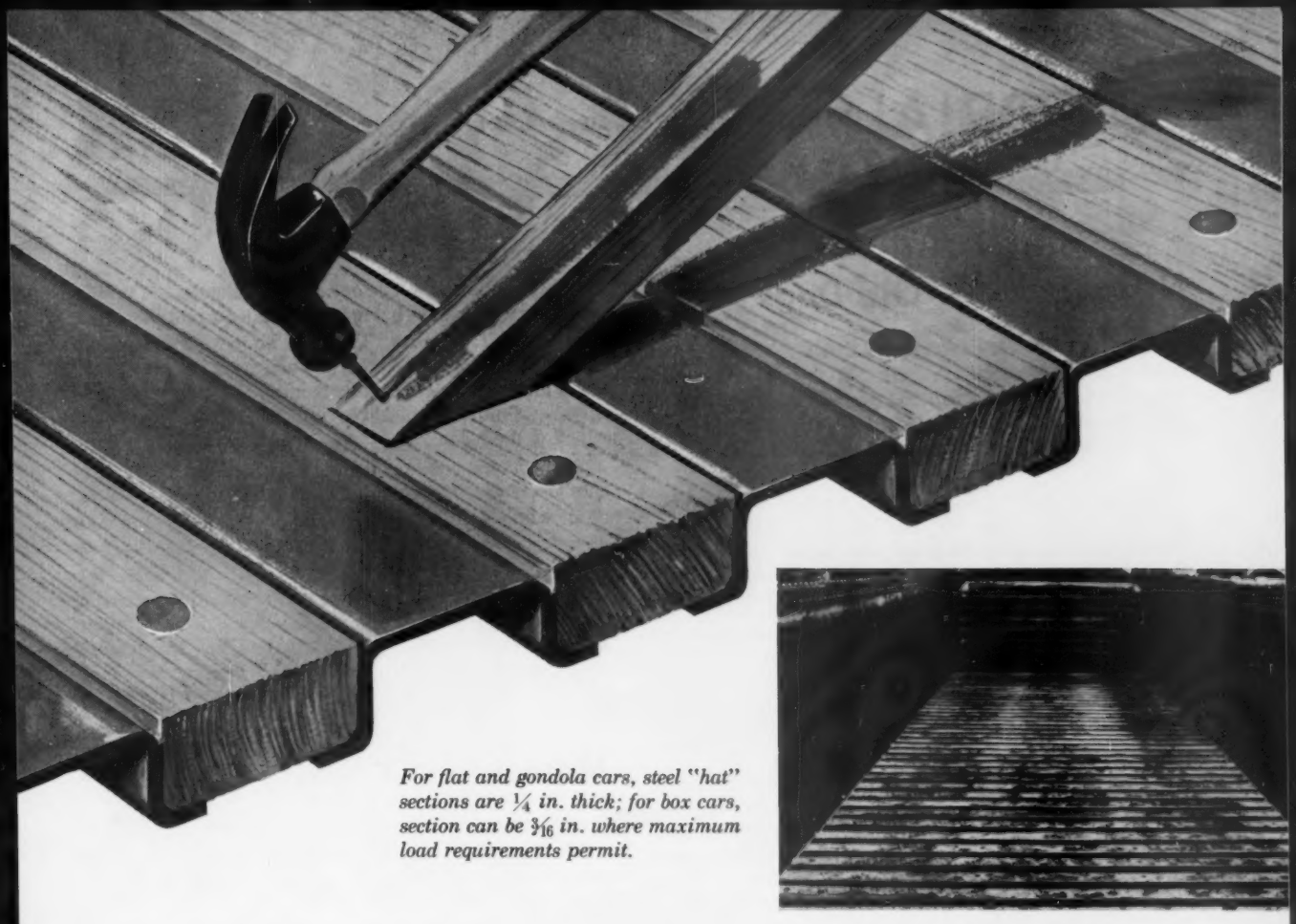
Now's the time to plan cost and weight savings with maximum efficiency through Spicer Traction Motor Drives. Write today for the latest Spicer Technical Bulletin.

DANA Spicer

DANA CORPORATION

Toledo 1, Ohio

SERVING RAIL TRANSPORTATION—Transmissions Universal Joints • Propeller Shafts • Generator Drives Rail Car Drives • Pressed Steel Parts • Traction Motor Drives • Forgings • Stampings.



For flat and gondola cars, steel "hat" sections are ¼ in. thick; for box cars, section can be 3/16 in. where maximum load requirements permit.

Strength of Steel, Nailability of Wood FOR YOUR FREIGHT CAR FLOORS

Bethlehem Composite Wood and Steel Flooring

With Bethlehem Composite Wood and Steel Flooring, you give your box, gondola, and flat car floors the ideal combination of strength and nailability. You reduce floor damage to a minimum, since there is no need for welding, drilling, burning, or otherwise marring the car floor. At the same time, your car can be used interchangeably in bulk service and in unit lading.

Basic unit of the composite floor is a rugged steel "hat" section of the type illustrated here. Welded to the side sill stringers and center sill, the hat sections are alternated on the car floor with wood planks of equal width and suitable thickness. The resulting floor provides the structural strength of steel, yet gives you all the nailability you could ever need.

Shippers have indicated an overwhelming preference for wood-steel flooring over solid steel or nailable steel types. If you would like further particulars on Bethlehem Composite Wood and Steel Flooring, ask your nearest Bethlehem office for Folder 713, or write direct to the address below.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

EDITORIALS

New Tricks for Old Dogs

With the advent of transistors and the development ot solid-state power rectifiers, a lot of new gear is being dropped into the laps of railroad mechanical and electrical department men. It is equipment which should relieve worry rather than create it, but this is not inevitably the case.

The static rectifier is not new. Anyone who can remember railroad shops 50 years ago will recall the green-blue light given off by the glass tube mercury-arc rectifier used to charge batteries in the battery shop.

Then in the middle 20's engineers made a new discovery and manufacturers came up with the copper-copper oxide, solid state rectifier. It was a most useful tool. It didn't revolutionize the world but it put a new principle into practical operation. It was followed by improved solid-state rectifiers using selinium, germanium, and quite recently, silicon.

In the railroad field in 1930, sealed type, multi-phase mercury-arc rectifiers were developed to supply the Delaware, Lackawanna & Western suburban electrification. This was such a new development that considerable trouble was at first experienced with arc-backs. These problems were solved without causing inconvenience to the railroad operation.

It had long been wished that mercury-arc rectifiers might be used on locomotives and cars to permit their operation with an a-c trolley and d-c motors. This had to wait for the sealed-type rectifier with suppression of communication circuit interference. Then by coordination with telephone and telegraph operating companies, a rectifier car was operated successfully by the Pennsylvania in 1950. This was followed by the building of two Pennsylvania rectifier type locomotives. Subsequently the New Haven placed in service 100 rectifier type m-u cars and 10 locomotives. There are also 12 rectifier locomotives on the Virginian (now Norfolk & Western). Attempts, notably in England, have been made to operate d-c traction motors from an a-c contact system by means of solid-state rectifiers. It appears that this will be accomplished, but there still remain some hurdles which must be overcome.

Coming to diesel-electric locomotives, we are now being introduced to the transistor and the silican diode or rectifier. Both have been practical operating devices for only a few years. In that brief time, the transistor has almost revolutionized the electronics industry. It is being introduced to diesel locomotives in the form of static control which is inherently rugged and which eliminates moving parts. The solid-state silicon rectifier will stand higher temperatures and higher voltages than other solid-state devices, but temperature, current on voltage limits must not be exceeded. When this is done only briefly, the rectifier becomes a conductor and a short circuit results.

It is sometimes the custom of repairmen to use a 500-volt resistance tester (having very small current output, as a ringer or circuit tester. This does no harm if the current flows in the proper direction. When used in reverse, the tester may puncture the static rectifier and destroy its usefulness. Similarly, transistors must be given the respect which is their due.

Such limitations are perhaps unfortunate, but they should not discourage the prospective user. The silicone diode will by itself and without moving parts function both as a reverse current relay and a means of charging batteries.

Transistors in a locomotive control eliminate moving parts and are free from damage by dirt and other contamination. Their advantages are so great that they should be given every chance to prove their worth.

More Men to S. F.

For the first time since 1952 the annual meetings of the AAR Mechanical Division and the Electrical Section, Engineering and Mechanical Divisions, are to be held on the West coast. The June 14-16 meetings at San Francisco will be accompanied by exhibits of the Railway Electrical and Mechanical Supply Association, an attraction that the 1952 convention did not offer. Because of the exhibits and the location of the meetings the utmost cooperation of the railroads in getting men to San Francisco is needed if the convention is to be termed a "success."

In 1952 the meeting was attended by 456 railroad and 358 supply men. Most meetings with equal numbers from the two groups are considered to have a favorable ratio. This year the exhibits, while attracting more railroad men, will bring to San Francisco a far greater number of exhibitors' representatives. This fact alone is no reason for railroad men to attend but the supply men will be there to tell how their products will help the railroads and this story is important to all roads. They deserve the greatest possible support of the railroads in promoting a receptive audience.

The location is unfavorable for a large attendance from eastern roads. Many have indicated that they will send only a small percentage of the number that normally attend the meetings held at Chicago because of the time and cost involved. It is to be expected that the representation from eastern roads will be less, but not to the extent indicated by reports to this publication. Certainly all personnel on AAR committees should be present, yet many will be absent from the meetings if present quotas are observed.

Are mechanical department officers timid about requesting adequate representation? If so, why? Should these officers not have as much faith in the railroads as the industries the railroads support?

NEW SIOUX air slugger

DOES 101 JOBS IN HALF THE TIME!

METAL WORKERS KIT NO. 270C

METAL CUTTER—
CUTS METAL SMOOTH & FAST!
—moves accurately and cleanly through sheet metal with excellent maneuverability and on any cutting radius.

CHISEL—**SHEARS BOLTS, SPLITS NUTS,** pulls pins, breaks spot welds.

RIVET BUSTER—**SHEARS ALL TYPES OF RIVETS**

PUNCH—**PUNCHES OUT PINS, BOLTS,** studs, rivets, bearing races, and pressed bearings.

SCRAPER—**SCRAPES AWAY RUBBER COATING,** insulation or almost anything without damage to metal.

SHEET METAL PUNCH—**PUNCHES PERFECT HOLES FOR METAL SCREWS**—A precision made sheet metal punch that will punch perfect holes for metal screws faster than you can put them in place.

EXTENSION CHISEL
GETS AT THOSE "HARD TO REACH" PLACES and shears bolts, rivets, pins, breaks spot welds.

SPOT WELD BREAKER
BREAKS SPOT WELDS QUICKLY, easily, inexpensively. A hardened tool that will take long, hard, punishing use.

CRIMPER—
MAKES A STRONG NEAT, SHEET METAL JOINT, means faster, neater, better work, and more profit.

The SIOUX Air Slugger is one of the most useful of air tools. It will not create the hazard of fire or explosion and will save cost of torches and gas. Design features include a one piece barrel with no parts to get misaligned or wear out; and a cast iron handle that will survive the roughest treatment. It's light, sturdy, and SIOUX dependable.

Look for **SIOUX** *Tools in the yellow pages under "TOOLS, ELECTRIC"*

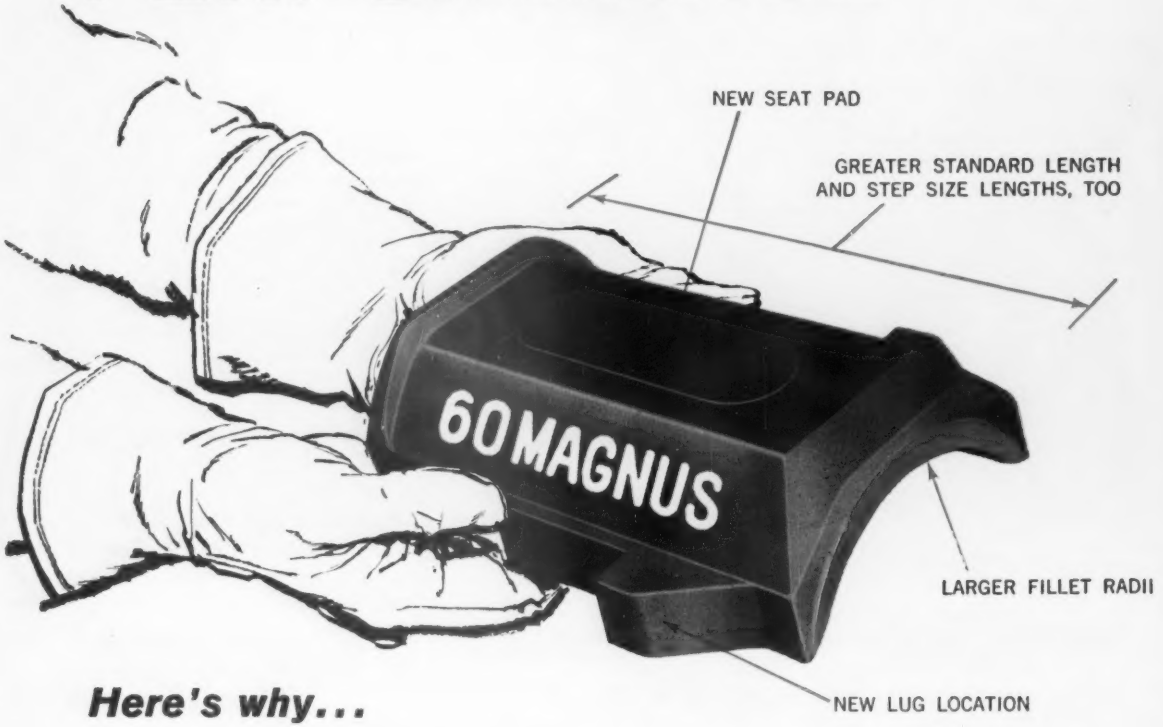
ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.

AIR IMPACT WRENCHES • AIR SCREWDRIVERS • ELECTRIC IMPACT WRENCHES • DRILLS • SCREWDRIVERS • GRINDERS • SANDERS • POLISHERS • FLEXIBLE SHAFTS • PORTABLE SAWS • VALVE GRINDING MACHINES • ABRASIVE DISCS.

New AAR Standards promise MAGNUS SOLID BEARINGS

a NEW HIGH in PERFORMANCE



Here's why...

THE NEW raised-back bearing (above) has been designed for better load distribution, reduces lateral play, equalizes thrust loads and reduces wiping at both fillets, promising improved performance and economy in freight car service.

The new raised seat pad gives controlled radial load distribution—puts preferential loading in the middle of the journal where lubrication is more abundant and uniform. This reduces heating and contributes to longer trouble-free mileage.

Standard bearings are ¼" longer, increasing bearing area and reducing lateral play. Step sizes are also increased in length, tending to reduce lateral play on worn journals. This, together with new lug location, gives more balanced thrust loading.

Fillet radii have been increased at both ends of the bearing for further reduction in end wear and reduced wiping of the babbitt.

These design modifications should help establish a new high in the performance of low-cost solid bearings. For further information write to Magnus Metal Corporation, 111 Broadway, N. Y. 6, or 80 E. Jackson Blvd., Chicago 4.

MAGNUS METAL CORPORATION

Subsidiary of **NATIONAL LEAD COMPANY**

Detection of journal flaws with cart-mounted reflectoscopes has become systematic process at yards and repair tracks on the Seaboard.

Mobile Units Check Freight-Car Axles

Seaboard designs and builds powered carts which are making possible ultrasonic journal testing in close-clearance yards

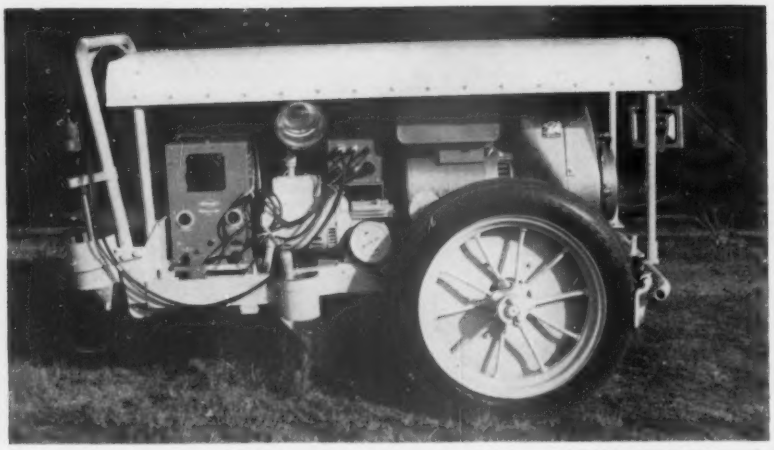
Results produced by ultrasonic reflectoscope equipment at the Seaboard's Hamlet, N.C., wheel shop proved so valuable in detecting flaws in freight-car journals that the road now has nine mobile reflectoscopes in service at important yards and interchange points. One of these is a standard Sperry reflectoscope car (RL&C), June 1959, p. 22) and the other eight are self-propelled carts designed and built by the Seaboard to carry the Sperry ultrasonic testing equipment.

To date, this all-out attack on defective freight-car axles has been locating one such axle for approximately each 500 cars inspected. All solid-bearing cars, both system and foreign, are usually inspected at sites where mobile units are in use, and all cars are marked to indicate this inspection. This is done with a decal system which indicates the month so that the procedure can be repeated after three months—the interval which the road's mechanical department has established for the inspection of system cars.

The first mobile unit was the Sperry-built car in which the operator can ride. Later last year, a program was authorized to build the eight self-propelled carts. Costing considerably less than the car in which the operator rides, the Seaboard-built carts can be easily manipulated in the restricted work areas available in some receiving yards and at car repair tracks. They are now used at all points with fairly large numbers of cars for inspection and repair, or where interchange cars are received. When an operator goes to work on a yard or car-repair track, he inspects each solid-bearing car, system or foreign, which has not been inspected during the previous three months.

Two of the carts are operating at Hamlet where cars are reflectoscoped in the receiving yard prior to their going through the classification yard. Initially, the areas between tracks at Hamlet would not permit operation of the carts, and it was necessary to have the areas surfaced and packed and to have crossings built across the yard tracks to make it possible to move the equipment from one track location to another.

The reflectoscope carts are also in operation at Hermitage Va.; Howells, Ga.; Savannah, Ga.; Jacksonville, Fla.; Tampa, Fla.; and Montgomery, Ala. The Seaboard has found that an operator can inspect 30 cars in an 8-hr. day. All of the ultrasonic instruments on the mobile units are equipped with a Sperry sound alarm system set to operate when a specified metal separation is detected. The alarm has been supplemented with a bell audible over yard noise. This, according to Seaboard officers, has made it possible



Maneuverability is assured by having each of rear wheels powered by individual ½-hp ratio motors. Front of cart is carried on heavy-duty caster. Metal hood is removable, and cart is frequently operated without this hood in good weather.

for relatively inexperienced operators to use the equipment—men who might not interpret the equivalent indication on the cathode ray tube.

When the reflectoscope car and carts were initially put into service, the number of axles reported defective was high, and records showed considerable variation from point to point and between operators. As operators have become more skillful, it now develops that all points are finding about the same percentage of defective axles. Unusual variations between points are now detected by the Seaboard's electrical engineer who is responsible for checking the records of each of the inspection points, also the results obtained by the individual inspectors.

Initially, the Seaboard got considerable assistance from Sperry in the training of operators. Many axles which showed indications of defects were sent to the Seaboard's test laboratory at Jacksonville so that the findings could be checked.

Now if an axle is found defective at one of the line points, it is sent to the Hamlet wheel shop where it is reexamined by the reflectoscope operator there. This man has had extensive instruction and experience with the test equipment. If he is unable to confirm the defect, the axle is returned to service. Some defects which are located in train yards and at repair tracks can be verified by surface defects when the axle is removed from the truck. However, the Seaboard reports that the majority of defects which are found by ultrasonic inspection are internal.

The Seaboard cart costs approximately $6,000. All eight were built at the Jacksonville shop. The latest model has 3-in. channels stiffened by crossties to form the main frame. On this frame are mounted the reflectoscope and its associated equipment, an Onan 2,000-watt a-c generating plant powered by a gasoline engine, and two ½-hp a-c gear motors which are fitted with right-angle drives and V-belt pulleys. The machine is carried on two 26-in. rubber-tired wheels which are individually driven by V-belts from the separate motors. It is through control of the belt drives of these two propelling motors that the cart is steered. The rear of the unit is supported on a rubber-tired swivel caster. The cart has two adjustable floodlights for night work.

Decals with numbers *1* to *12* printed around periphery to denote months are used to mark sides of cars which have been reflectoscoped. Each cart has a punch which puts symbol at proper month on decal prior to application. Operators check decals on cars to reinspect after three months.

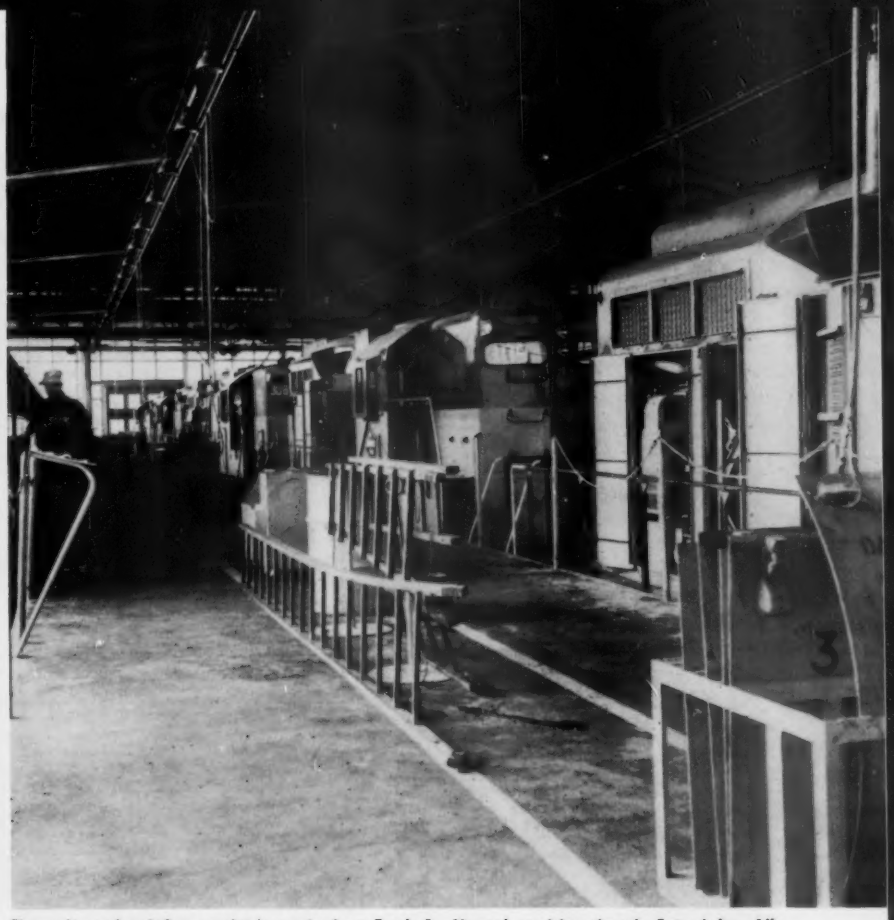
Costs assessed to reflectoscope operation by the Seaboard include wages of the operator, a carman, and the cost of gasoline and oil for the engine generator. As yet, no maintenance figures have been developed. Each operator inspects an average of 30 cars per shift, which means that about 600 cars can be inspected monthly if they are available. The Seaboard is well satisfied. "We feel," reports H. S. Mercer, chief mechanical officer, "that, considering how much can occur in cases of broken journals, this equipment is proving quite beneficial."

Reflectoscope is Sperry style 50E497. Bracket is provided to hold the multi-crystal, rotary search unit probe. The 115-volt a-c generator powers drive and floodlights as well as ultrasonic unit.

Width of 2 ft 6 in. makes it possible to get self-propelled car through close clearances. Steering is controlled at the handlebar.

Two-button control "inches" diesel engine for inspection of pistons and rings.

Batteries are washed and filled on upper level from overhead lines.



Five-unit road switcher consist is serviced on Track 3. Normal servicing time is 5 to 6 hr. All servicing equipment is stored between lines painted down centers of platforms.

Milwaukee One-Spot Running Repairs

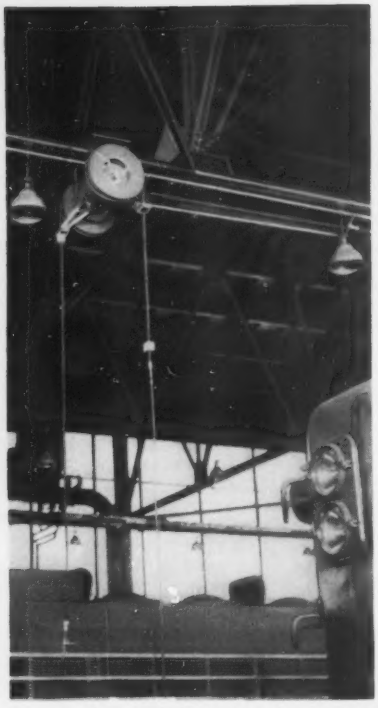
PRODUCTION LINE TECHNIQUES—bringing work to the man—have been incorporated in a one-spot running repair system in the Milwaukee's enginehouse at Milwaukee, Wis. The four service tracks have a capacity of four units each and are equipped with the conventional elevated and depressed platforms and track pits.

The new system, designed for high mileage freight units, is particularly adaptable for multiple-unit locomotive consists on the two center tracks. Four units can be completely serviced after the initial move into the house on Track 2. To handle five coupled units, generally road switchers, it is necessary for the lead engine to stop over the pit for underneath inspection and servicing on Track 3. The locomotive then moves over the Whiting drop table, spotting the remaining units at the proper location. Tracks 1 and 4 are for servicing passenger and local freight units, and switchers.

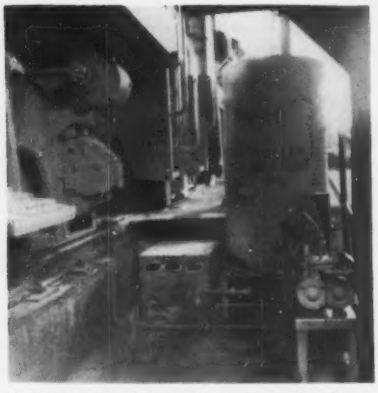
Each unit of a locomotive consist is a work location. Above and below the elevated platform, all materials and facilities needed for normal dispatchment are within easy reach of the workmen. Air and water lines are mounted on automatic reels above the top platform adjacent to two units. Lube oil hose and "inching" controls are recessed under grating covers in the platform. Lube oil is metered to the locomotive. Oil, water and air lines for below-running-board servicing are mounted underneath the top platform. Suspension bearing and journal box oil is circulated by pump and heated for easy application. Crater compound in 1-½ lb plastic bags is kept in a heated compartment at the end of No. 3 pit. Brake shoes in groups of four are located at each truck position.

Michiana and lube oil filters removed from the locomotive are placed in a wheeled cart at each spot location, sent to renovation, and returned in sets. The cart also has a supply of replacement gaskets. An electrician's cart containing fast moving items (brushes, lamps, and fuses) is moved from one spot to another as the units are serviced. Panel type air filters are removed and placed in a metal box, handled by a traveling crane to the filter room on ramp No. 1, renovated, and returned. Each spot location has a work report stand. Sand, fuel and washing facilities are provided outside the engine house. For sanding the road switcher consists, a platform on the sanding tower for the workman is equipped with a signal system so each unit can be spotted at the sand outlets. The operator is required to get on the platform only once to sand the consist. Car body units are sanded on the sides. Boiler water for passenger power is added at the fuel and wash station.

After the multiple unit consist is over the pit, the engines are shut down. Above the running board, the following operations are performed,



Automatic hose reels keep air and water lines off platforms. These reels are spaced on each platform at unit-length intervals.



Roller-bearing oil is continuously circulated. Box at left holds gear lubricant.

most of them concurrently with those below the running board.

- Doors are removed from the control cabinets and covers from the main generator, and equipment is blown out. Following this is an inspection for loose wires and bad contacts with necessary repairs.
- Batteries are washed and filled.
- Engines are started and idled while a top-deck inspection is made.
- Engines are shut down. Panel air filters, Michiana filters, fuel filters and lubricator screens are removed, renovated and replaced.
- Engine is "inched" or rolled over to examine for scored liners, broken rings and make the top-of-piston inspection. This is done by the same two men who do top-deck inspection.

The engine is turned over with a 400-amp welder which is located on the lower platform. Receptacles for this welder are located at positions between every other unit. Two leads are connected to the main generator which acts as a motor. Each unit station has a two-button contact which will either "inch" the engine to expose pistons and rings or rotate the engine continuously.

Below the running board—

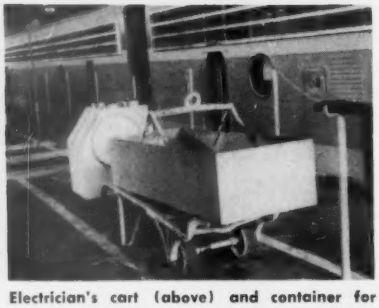
- Journal box oil is applied to roller bearings;
- Brake shoes are removed and replaced where necessary;
- Suspension bearing oil is added from a distribution system with pipes between the rails and outlets at each truck location;
- Crater compound is added to traction gear cases;
- Brushes, pigtails, and leads on traction motors are inspected;
- Engine cooling water is added;
- ICC inspections are made.

After all units are serviced, the consist moves outside for a throttle test in 8th position. Check is made for lubrication leaks, and proper loading of all units. The locomotive then moves to ready or storage track. At present, only Track 3 runs through the house. Units on other tracks move out the same way they enter. An additional track outside the house is planned to make the operation more flexible.

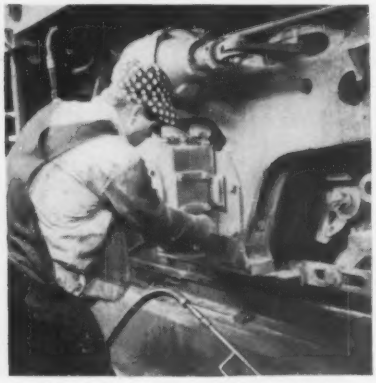
Personnel Required at Spot Location

	Above running board	Below running board
Electrician	1	1
Electrician helper	1	1
Machinists	2	1
Machinist helpers	2	1
Machinist (filter—pick-up sheet work)	1	-
Machinist (engineer work reports)	1	-

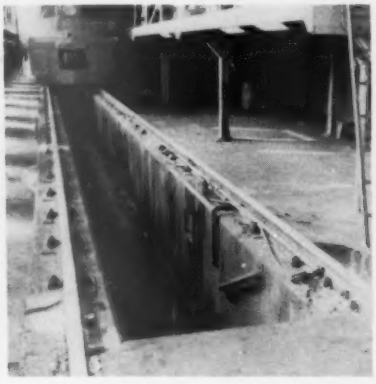
Three electricians and one helper required on a five-unit road switcher.



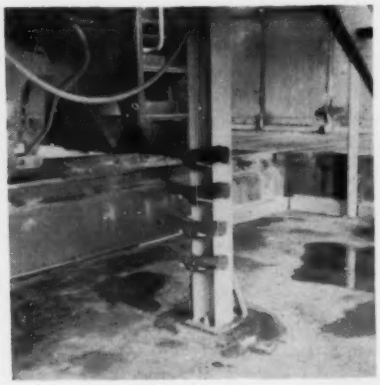
Electrician's cart (above) and container for panel air filters (below) facilitate servicing.



Heated oil is applied to roller-bearing boxes from circulating system below platform.



At each truck location are suspension bearing oil outlets so that unit need not be moved.



Brake shoes are racked on upper platform column supports at each truck position.

Sloping of sides and ends means that ore unloading is simplified. Car has a capacity of 1,048 cu ft and an inside length of 21 ft 6 in.

Top chords are heavy box sections. Welding provides a smooth interior. Floor is ⅜-in. plate.

Pennsy Ore Hauls Rate Special Cars

High-capacity, flat-bottom gondolas are designed to move iron ore from ports to inland steel centers

THE PENNSYLVANIA FREIGHT-CAR FLEET now includes 1,000 cars designed for the movement of iron ore. Construction of these short 70-ton flat-bottom gondolas has just been completed by the Pennsy's Samuel Rea shop at Hollidaysburg, Pa. These 43,000-lb cars are a part of the $215,000,000 program which, when completed, will give the PRR a total of 23,500 new and rebuilt cars of various types.

Growth of import ore traffic, which now gives the Pennsy a substantial year-around ore movement, has made acquisition of specialized cars practicable. In the winter, these PRR Class G38 "jennies" will carry seaboard and stored ore to inland steel centers and, during the summer, they can also participate in ore movements from Great Lakes ports. The winter movement of iron ore in the Northeast is of growing importance and has at times made it necessary for the PRR to lease as high as 2,500 of the hopper-type ore jennies from railroads in the Lake Superior area.

When it was determined that special cars could be justified the Pennsy went all out to tailor a car for its service. The floor of this jenny is flat and without openings. L. E. Gingerich, chief mechanical officer, explained that hopper cars were eliminated from the design after a survey of steel plants showed that they could handle flat-bottomed cars on their dumpers. Advantages of the fixed bottom design, he said, include economies in construction and maintenance, added strength, and elimination of leakage. Maintenance costs are expected to be reduced by about 25 per cent with the elimination of hopper doors.

Smooth Interiors

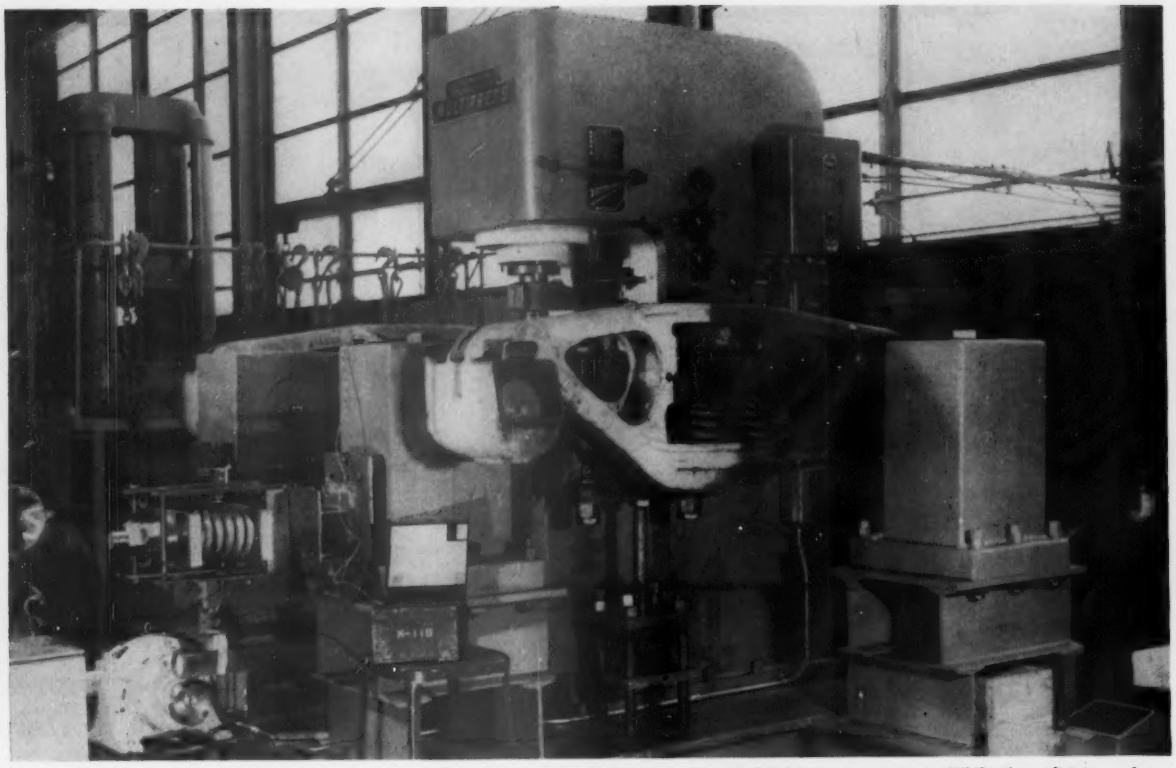
To make the cars as self-clearing as possible at dumpers, sides and ends are tapered outward slightly from the car floor. A smooth interior is provided by using outside and end stakes and by the all-welded construction. The car has 32 poke holes in the sides through which steam pipes can be inserted for thawing frozen loads.

Length of ore jennies owned by Lake Superior iron-ore haulers is limited by the spacing of the unloading pockets on the docks—so limited that special draft gears are necessary to keep overall car length down. Without such limitation, it was possible for the Pennsy to design a car with a coupled length of 27 ft 6 in.—a length which permits use of conventional draft gears. The 1,048 cu ft capacity of the G38 provides a car which it is virtually impossible to overload with iron ore—something that must be closely watched with conventional hopper cars in this service. The shorter trains which these cars make possible are conducive to better handling, and the cars occupy less track space in yards.

Extensive use has been made of low-alloy, high-tensile steel. As compared with a conventional hopper car on trucks of the same capacity, the Pennsy jenny can carry 5½ tons more payload and requires 6½ tons less steel in its body. This 40 per cent reduction in body material results in a car which is $1,000 less expensive. While the nominal rating of the jenny is 70 tons, its load limit is 83 tons.

The design has a light-to-loaded weight relation which requires an empty-load brake. Automatic slack adjusters are used. Flame deflecting plates have been installed under the air-brake equipment to prevent damage at open-flame thawing pits.

The car has a center sill fabricated of 51.2 lb AAR Z-sections. The floor is ⅜-in. LAHT steel, and the sides and ends are ¼-in LAHT. Box-section top chords are formed by welding two 6-in. channels together. The carbody is welded throughout. Special welding jigs were built for some operations.



Trucks and their associated parts are primary targets of a whole series of AAR research and development programs. While the solid journal assembly has probably received the most attention, work is currently being done on brake-beam fatigue for which the above set-up was built.

Research Solves Mechanical Problems

AAR Research Center continues development of equipment and standards to make possible better railway service

Hot boxes and draft gears have received primary attention in the research programs of the AAR Mechanical Division over the past year. A revised solid journal bearing design is now standard. The AAR Research Center played the major role in its development. The revised standard journal bearing is interchangeable with the present bearing and is expected to give longer life, an improved bearing pattern, and better lubrication performance.

The draft-gear program was expanded in 1959. Under the new program, performance tests in actual road service are required for each new draft gear given AAR conditional approval. Forty calibrated gears of each new design are applied to cars in heavy service. Before the gears are approved for unlimited application, selected groups are returned to the Research Center after two and four years' service. Any loss or increase in capacity will then be determined by calibration.

Development and construction of new equipment to evaluate the performance and characteristics of the journal-box assembly has continued. With the cooperation of the Lubrication Committee, specifications and test procedures for lubricators were tightened last September. A study of oil-feed characteristics of all "approved for test" and "conditionally approved" lubricators at temperatures from minus 50 deg F to 130 deg F is being made on two portable oil-feed machines which are operated continuously in a newly built controlled temperature room.

During the first six months of 1959, a field task force inspected 17,256 journal boxes to determine the principal cause of hot boxes. Condition of the bearings, wedges, journals, trucks, wheels, center plates and side bearings was inspected and evaluated for each hot box.

The machine for testing rear journal-box seals has been modified to increase the simulated speed from 50 to 60 mph.

An inexpensive container to serve as a hot-box detector for the solid bearing assembly is undergoing field tests. A copper cylinder, to be placed on top of the dust guard, is sealed with a low-melting-point alloy and filled with a chemical, developed by Armour Research, which produces a dense smoke and an odor. The new journal and bearing machine, which can load a test journal at up to 30,000 lb hydraulically, simulates a road speed of 67 mph based on 33-in. wheels. This device has been used to investigate lubricators and study the performance of the solid-bearing journal-box assembly. The journal and bearing machine has also been used to study wheel loading. The driving wheels have been machined to duplicate an average rail

(*Continued on page 31*)

EQUALIZE BRAKE FORCES..

BRAKE BALANCERS

Eliminate truck distortion . . Greatly reduce maintenance . .

Development of the Wine Brake Balancer has proved the solution to unbalanced braking forces that develop with the conventional truck brake arrangement.

The Wine Brake Balancer replaces the standard dead lever connector and eliminates the necessity of the dead lever connector bracket on the truck bolster.

Instead, the Wine Brake Balancer has brackets secured to the center sill flange at each end of the car, and connectors extend from these brackets to the dead levers on the truck. This arrangement "balances" the brake forces by returning them to the underframe of the car. This simple, yet rugged design meets all service requirements on any capacity car. Write for complete details.

THE WINE RAILWAY APPLIANCE CO., TOLEDO 9, OHIO

Now!

A lifetime lubricating oil for railroad diesels

Results from 3 years of over-the-rails freight service show that Shell Talona RS Oil 40 is a lifetime lubricating oil for railroad diesels!

New facts about Shell Talona RS Oil 40 performance are still coming in from railroad operators across the country, all pointing to a new concept of locomotive diesel crankcase lubrication.

For example, one major railroad using Talona® RS Oil 40 in heavy-duty freight service reports that its diesels have run in excess of 200,000 miles and give no indication of requiring an oil change.

Railroad operators with the most experience using Talona RS Oil 40 are convinced that diesel engine life between overhauls can be greatly extended too. Furthermore, their experience indicates that Talona RS Oil 40 will last for the full overhaul life of the engine.

• • •

Put this revolutionary new oil in your own diesels and demonstrate these cost-saving results yourself. Contact your nearest Shell Railroad Service Engineer.

SHELL TALONA RS OIL 40 is specially compounded for today's high-output railroad diesel engines.

Twice the anti-wear protection. Results show that Shell Talona RS Oil 40 will give *at least 4 years* of service between engine overhauls against 2 years or even less with conventional oils.

Longer filter life. Shell Talona RS Oil 40, with its excellent filterability, safely absorbs more contaminants than conventional diesel lubricating oils . . . affording still further dollar savings by extending filter change periods. It holds contaminants in a finely divided state to prevent sludge deposit formation which could interfere with proper lubrication.

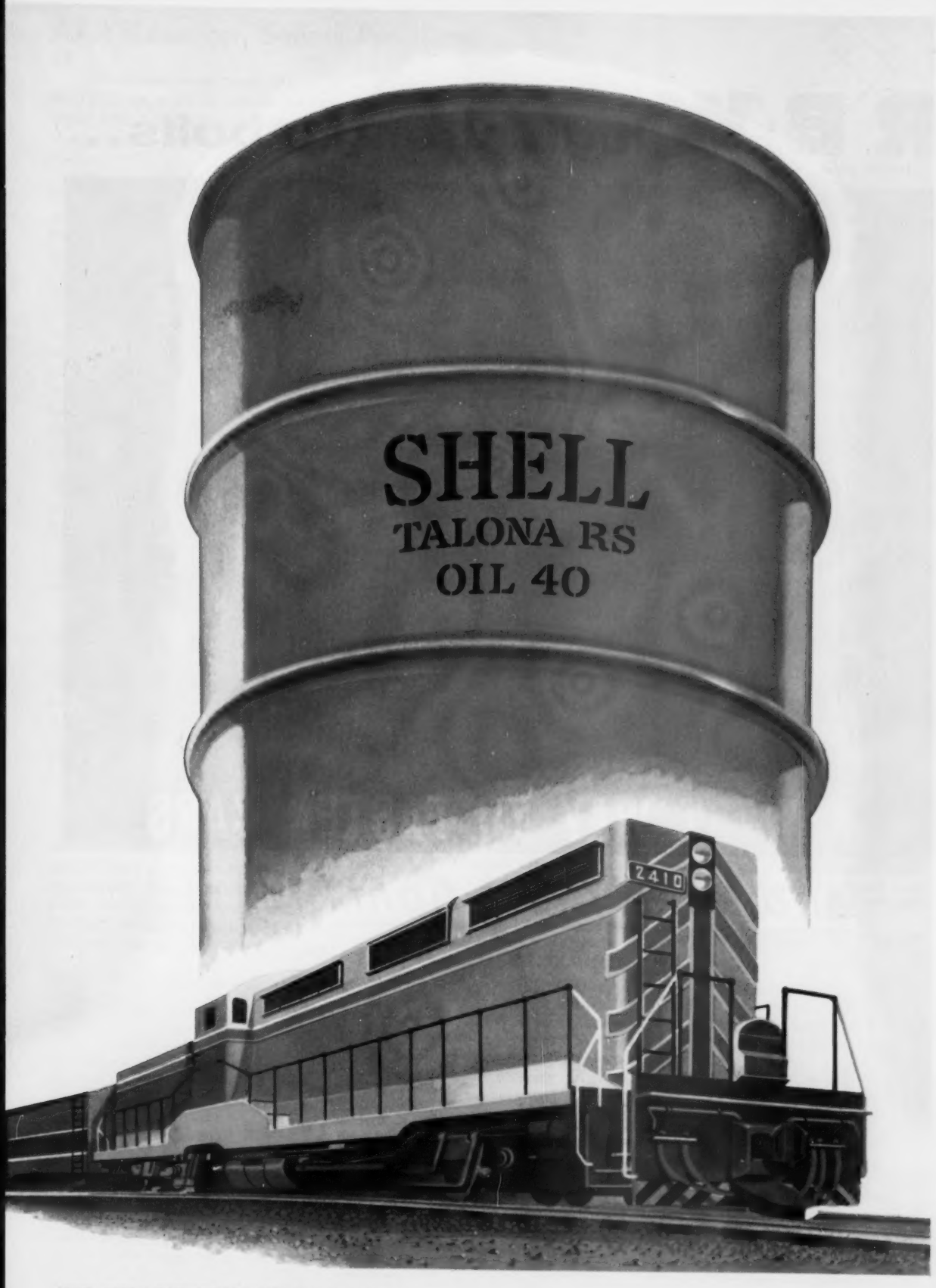
Unmatched engine cleanliness. Talona RS Oil 40 effectively fights deposit build-up... keeps engines remarkably clean. At the same time it cuts down oil consumption. And you know that a cleaner engine involves considerably less expense at overhaul time.

Excellent silver bearing lubrication. Shell Talona RS Oil 40 protects silver bearings. It has special extreme-pressure additives that provide effective built-in protection *for the life of your engine.*

SHELL OIL COMPANY

50 West 50th Street.....New York 20, New York
624 South Michigan Avenue.....Chicago 5, Illinois
100 Bush Street.....San Francisco 6, California
In Canada: Shell Oil Company of Canada, Limited,
505 University Avenue.....Toronto 2, Ontario

SHELL


SHELL
TALONA RS
OIL 40
2410

R B&W high strength bolts...

115th year

NEWEST WAY TO FASTEN CARS

and keep them tight!

THIS PROVED, SUPERIOR FASTENING METHOD for rolling stock is already cutting maintenance costs and time for a number of leading roads. Used in place of rivets, RB&W High Strength Bolts are assuring more reliable joints for cars even in the severest service. Here's why:

The higher the *clamping force* exerted by fasteners, the stronger the connection becomes. Force from rivets is due to contraction from cooling and is unreliable. Force from bolts is due to wrenching, and is positive and uniform. Actually, high strength bolts clamp structures together with *more than double* the highest force possible with rivets. Experience confirms that such bolts stay tight under the constant vibration and shock loads that so often cause rivets to loosen and fail, and equipment to go back to the shop for repair.

Take full advantage of this new development pioneered by RB&W. You'll benefit too by the recognized quality of RB&W High Strength Bolts. Send for this Bulletin RR-1 which gives full details. Or see catalog 1c/RB&W in the Modern Railroads Catalog File. An RB&W engineer will be happy to discuss this superior fastening method with you. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.

Plants at: Port Chester, N.Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

AAR Research Solves Problems

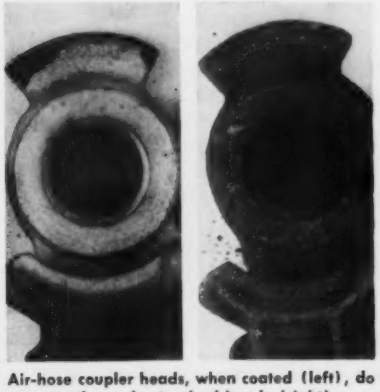
(*Continued from page 26*)
head contour, while the wheels on the upper assembly have been machined to an average worn wheel tread contour.

Stop tests have been completed on the A-40 standard production wheel. Approximately 2,000 stops were made from speeds of 40, 60 and 80 mph at brake-shoe pressures from 3,000 to 5,000 lb per shoe with clasp brakes. A maximum radial stress of 48,000 psi was produced at the outside hub fillet after a test series of 30 consecutive stops from 80 mph at 5,000 lb shoe pressure. A stress of 39,000 psi was noted at the inside hub fillet at the same time. Temperatures were 174 deg F at the outside hub and 306 deg F at the inside rim. At the end of the test, a maximum temperature of 520 deg F was measured on the wheel tread and 790 deg F on one of the brake shoes.

Studies have been completed on a specially machined A-40 wheel to a specific plate profile and a plate thickness less than the production wheel. The data shows a maximum radial stress of 58,000 psi was developed at the outside hub fillet and 33,200 psi at the inside rim fillet under the same test conditions as used with the standard production A-40 wheel.

Draft Gears

Impact tests are being conducted with eleven different draft gears. Each gear is given a complete laboratory test to establish capacity and reaction forces at various intervals during closure. The gears are being installed in two test box cars loaned by the L&N. Both the striking and struck cars are equipped with the same type of gear for each test series. Initially, the struck car was sprayed with a stress coat and then compressed to determine critical stress areas. The underframe showed no signs of rupture or distress under statis loads up to 800,000 lb applied at center line of draft through the rear draft-gear stops. High stress areas were pin-pointed. SR-4 strain gages were placed at critical points of the underframe and other selected points. The reaction forces measured on the underframe and in the dynamometer couplers will be correlated with those measured during calibration tests.

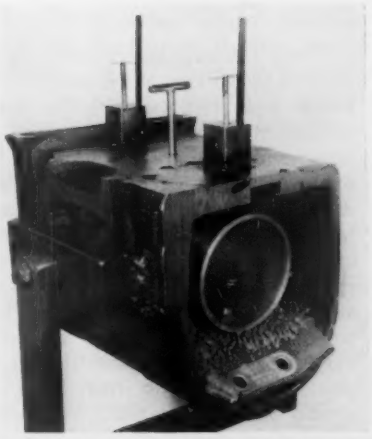


Air-hose coupler heads, when coated (left), do not corrode as do standard heads (right).

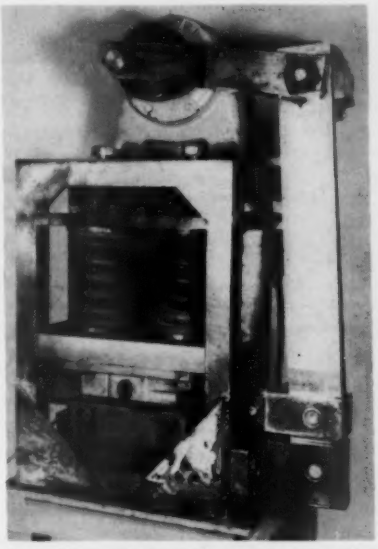
Extension of the periodic COT&S for AB brake equipment from 48 months to 60 months is a possibility this year. Improvement in the mechanical parts of the AB valve, plus a new lubricant, are under study. Brake-cylinder grease tests are continuing with lubricants other than conventional greases. Fatigue tests are being made both on hanger and unit-type brake beams of various designs to develop a new test procedure for the brake-beam specifications.

Air-hose coupler head gasket grooves coated with protective materials are being subjected to high humidity to determine if any of the materials will reduce or prevent corrosion. Brake-shoe keys have been studied under severe vibration to determine whether the various designs will prevent wear between the brake shoes and heads. The spring-type test was so favorable it is expected recommendation will be made to standardize it.

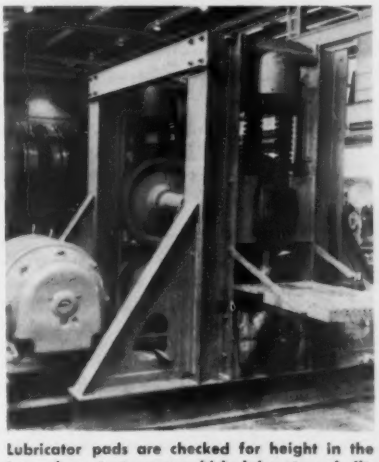
The AAR Isotopes laboratory has equipment which permits use of radioactive materials for tracer studies of railway devices and materials. An AEC license makes possible use of isotopes which can be added to petroleum products. Future radioactive studies will include the wicking action of oils through lubricating materials and measurement of film-oil thicknesses of oils in the solid journal bearing system. A cooperative program with the Radiation Division, U.S. Army Quartermaster Corps, on irradiation of foods and vegetables is expected to increase storage life and may lower the necessary refrigeration capacity. One test shipment of potatoes, irradiated with a Cobalt 60 source, was moved from Hartland, Maine, to Chicago. The potatoes were returned to Maine for biological examination.



Journal contact gage measures height of lubricator pads.



Journal-box wedge machine moves test wedge back and forth 2½ in. under full axle loads.



Lubricator pads are checked for height in the journal contact gage which laboratory built.

Slip Control for High-Power Diesels

Today's diesel-electric locomotives seem to be working at the limit of adhesion and, with currently standard equipment, they probably are. Slip detection and slip correction procedures of older, low-horsepower diesel-electric locomotives are inadequate for today's high horsepower-per-axle units. The belief has sprung up that slipping would limit the usefulness of a high horsepower diesel-electric locomotive and might lead to such maintenance expenses that the high-power diesel-electric locomotive should not be considered. The evidence developed by General Electric during the course of tests with 2,500-hp four-axle road switchers, which were first put into experimental service last year, shows:

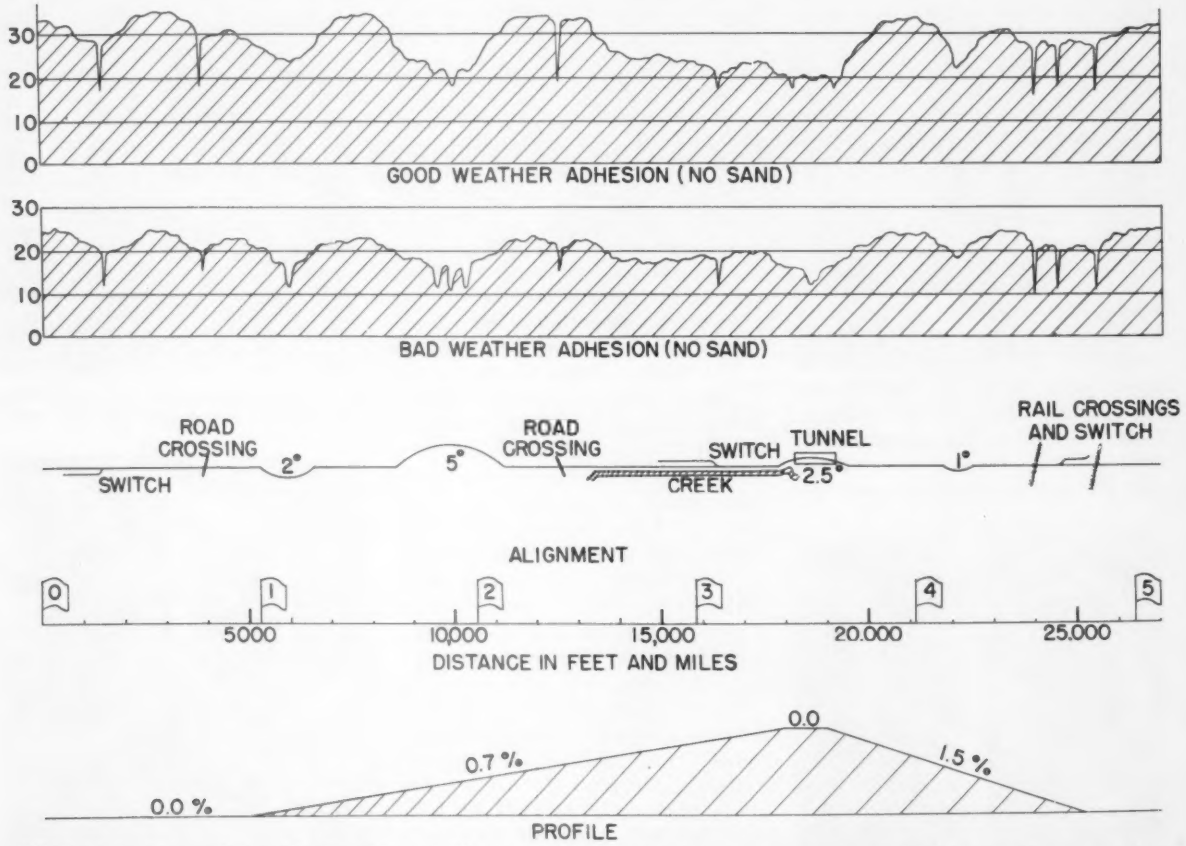
- Good slip detection and correction enable a locomotive to make use of prevailing stretches of good adhesion and effectively develop high horsepower per driving axle to move trains economically over a railroad;
- Low adhesion occurs intermittently, and there are stretches of good adhesion interspersed between the slippery spots.

From the earliest days of railroading, there has been slipping of locomotive drivers. In attempts to solve this problem, adhesion has been measured, and measured, and measured again, each observer hoping that, where others had failed, he would be able to nail it down once and for all. The fact is that no adhesion curve ever drawn is a guarantee against slipping. A typical adhesion curve is an array of scattered points, rather than a curve, and that gives the true picture of adhesion.

As a result of the original work he has done in the field, R. K. Allen of General Electric has published the explanation of wide variations in adhesion values (Wheels Slip — Science Tells Why, RL&C, October 1954, p. 86). He has brought out how adhesion varies from hour to hour in a given spot and varies foot by foot along the track.

Tapes taken in 1959 on a 2,500-hp four-axle freight locomotive in daily service on the Erie show operation in bad weather when slipping was worst. Even without slip-correcting equipment, slips which occurred were spontaneously corrected. Adhesion values at which the locomotive was working just before the slips started were 12.3 per cent at 25 mph; 8.8 per cent at

Paper presented by J. C. Aydelott, systems engineer, Locomotive and Car Equipment Department, General Electric Co., before the ASME-AIEE Railroad Conference at Pittsburgh, Pa., April 20-21, 1960.



Adhesion is far from constant and is affected by such things as curves, grade crossings, tunnels, and switch frogs. R. K. Allen developed this chart showing a hypothetical section of the railroad. Adhesions for good-weather and bad-weather conditions are shown in per cent. This work is based on experiments conducted by Mr. Allen on actual sections of track. First results of his work were published in the October 1954 issue of Railway Locomotives & Cars. Subsequent work has confirmed the "slippery spot" concept.

35 mph; 6.8 per cent at 45 mph, and 5.6 per cent at 55 mph. Some slips extend 30 mph above the speed of the locomotive and then subside. Some exceeded the limit of the recorder, and one persisted for two miles.

These tapes illustrate the intermittent nature of adhesion and its wide variation in value. Not the rapid acceleration of the slipping axle. Adhesion must have dropped suddenly from values shown above to a much lower value. The characteristic of a series motor shows a tractive effort of 2 to 3 per cent adhesion at the maximum slip speed where acceleration stopped abruptly. Then, with no change in engine output, the slipping axle decelerated quite rapidly. This is all the more remarkable because sliding friction (slipping adhesion) is only a fraction of rolling adhesion.

According to tests described by C. L. Eksergian, sliding friction at a slip velocity of 30 mph above the locomotive speed is only about 20 per cent of the rolling adhesion value. Whatever this value was, it suddenly increased sufficiently to cause deceleration in spite of the fact that the engine was still delivering full power to the motors. In other words, when the slip starts, adhesion is much less than the axle tractive effort; when the slip subsides, adhesion is much greater than the axle tractive effort. Only the difference between this suddenly increased sliding friction and the engine output was acting to bring the speed down. Thus, the corresponding rolling friction, or adhesion, that caused deceleration must have been at least in the 20 to 30 per cent range.

Mr. Allen has prepared a chart based on his investigations of adhesion and slipping phenomena. While it does not represent any existing railroad, all its parts are typical sections of right-of-way representing most of the conditions encountered in railroading. Note the abrupt decrease in adhesion at certain places along the track and the fact that adhesion is low for only short distances. Work on which this is based was done on the Reading (High Driver-Rail Adhesion without Sand, RL&C, January 1956, pg. 59).

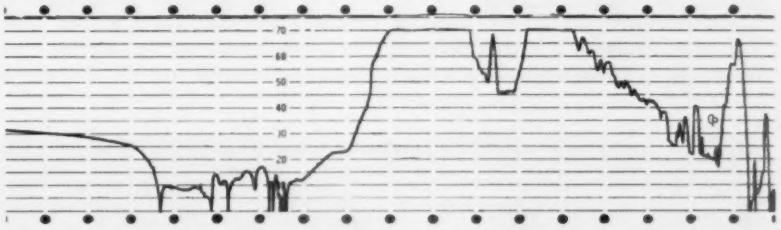
Not all wheel slips are self correcting. Because of this, it might be suspected that not all slippery places are of such short length. Slips that have been observed to continue for many miles can be explained. When in bad weather a slip starts in a slippery spot, the slipping axle accelerates rapidly and the speed of the wheel rim soon reaches a much higher speed than the actual locomotive speed. The sliding friction may reach a very low value. The locomotive wheel may develop its own slippery film, picking it up from the rail or from an accumulation of journal lubricant. The film is protected and spread by dew or mist and is renewed from time to time as successive slippery spots are crossed. Oil films are extremely thin, but very tough. The slippery spot concept is entirely compatible with the fact that slips have been observed which continued for many miles.

Mr. Allen reported that spread rails in curves permit an accumulation of dirt and oxidized journal oils on the rail head outside the area of wheel tread contact. In dry weather, adhesion is good on the clean part of the rail where the wheels run, but, in bad weather, a little moisture brings out the oil in a thin film to cover the whole rail and, wherever such accumulations have formed, adhesion goes to very low values.

While no trouble has been traced to the excessive slipping, it seems evident that a 2,500-hp four-axle diesel-electric locomotive should not depend entirely on self-correction of wheel slips. Apart from the locomotive damage, train handling is impaired. Speed recorder tapes are shown with slip-detection and slip-correction equipment in operation. Slip detection is based on comparison of the speeds of the several locomotive axles (New Wheel Slip-Slid Control Developed, RL&C, May 1959, p. 47). A small, simple, sturdy alternator is mounted on one end of each axle. A slight difference in axle rpm can be detected at any locomotive speed.

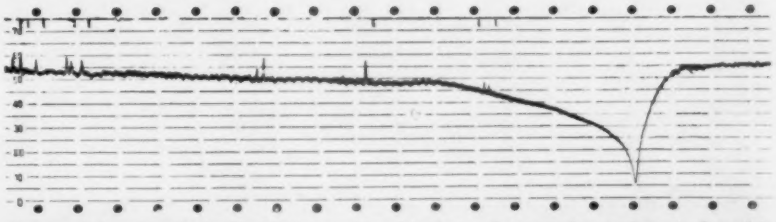
A "slip suppressing brake" was used as the slip-correction means (Wheel Slip Can Be Controlled without Sand, RL&C, January 1957, p. 46). This system employs an automatic, light, quick application of the regular brakes on the locomotive unit on which the slip occurs. With this, the engine continues delivering full horsepower output. The brakes are applied to all axles, but only slightly affect the output of the wheels that are not slipping, and take maximum horsepower from the slipping axle to decelerate it. The brake application also removes from the wheels slippery film which may have been picked up from a slippery spot and prepares them to again engage the good rail when it is available. The brakes are very quickly released when the slip ceases. Contrasts without and with slip correction are apparent on tapes. Slips can be "nipped in the bud." Individual slips occur a mile or more apart, triggered by slippery spots. There is also evidence that the slip suppressing brake application effectively cleans the rims of the wheels.

Without Wheel Slip Control

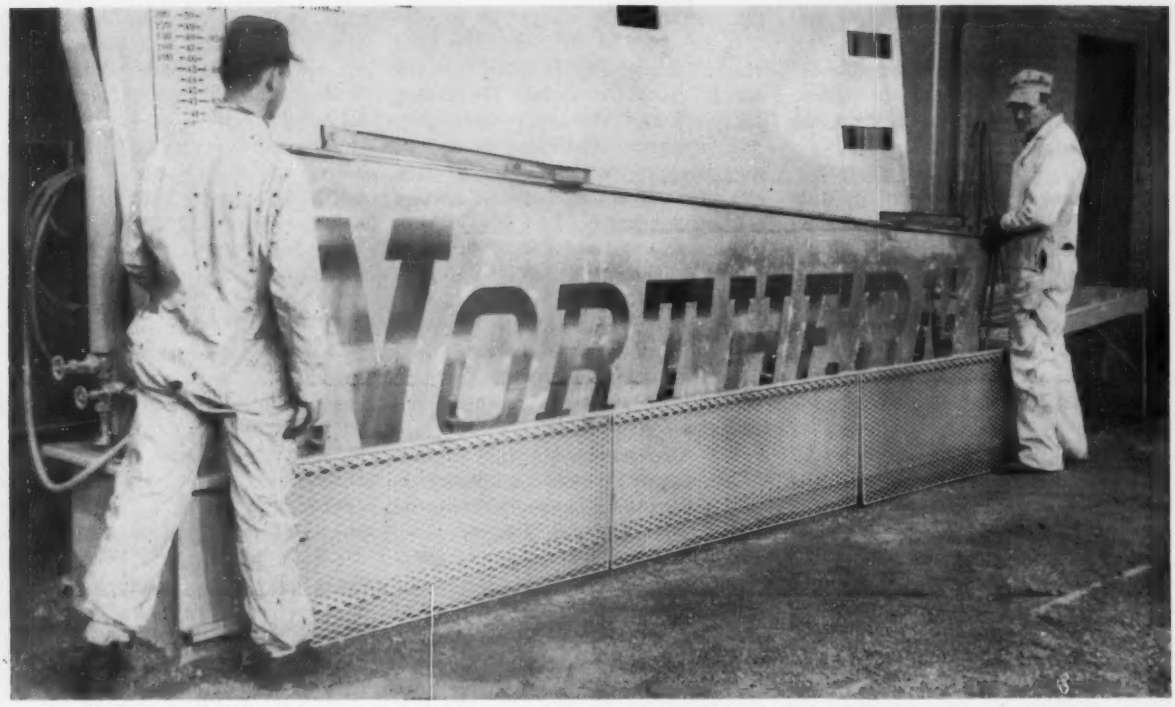


Slippage occurs frequently and axles reach speeds beyond range of recorder. Tapes read from right to left. Record is of fifth axle in locomotive consist running on "oily" rail.

With Slip-Suppressing Brake



Slips are "nipped in the bud" with the sensitive detection and suppression equipment. Record is of eighth axle in locomotive consist operating on rail covered with morning frost.



Metal stencil, 15 ft long, is lowered into the cleaning vat. Paper stencils cannot be cleaned by this process because of saturation.

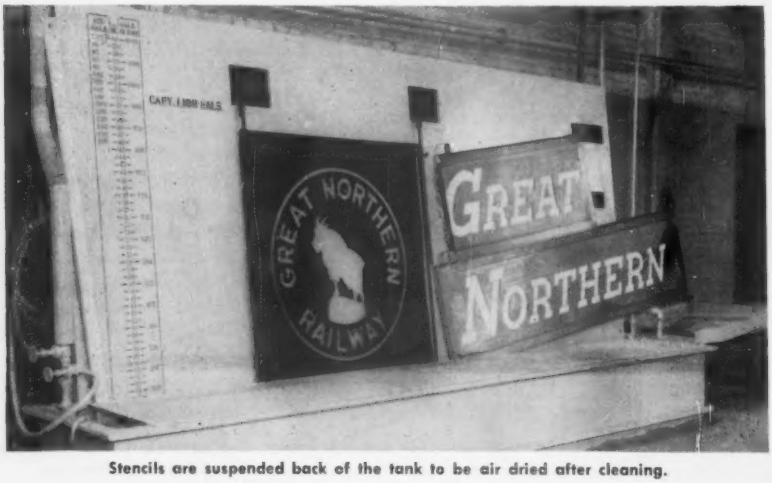
GN Improves Stencil Cleaning

Metal stencils with as many as 20 coats of paint are now effectively cleaned by the Great Northern in its St. Cloud car shops. Chemical solutions similar to those used in cleaning gears and diesel air filters have made possible a saving of approximately 63 per cent over former methods.

Until recently, the paint department had been washing the stencils with volatile paint thinners, some with flash points higher than gasoline. This involved tedious scraping, brushing and loss of man-hours. Under the new set-up, weekly material and labor costs are $31.82, compared with $86.51 for the paint thinner method. An intangible is reduced fire hazard.

The 10-gage black iron cleaning vat is 2 ft by 16 ft by 5 ft 3 in. high. It is buried 43 in. below the floor level and holds 1,200 gal of water at a 5-ft working depth. Five rows of 1-in. steam lines and one pierced air line, with perforations directed against the tank's bottom, are on the floor of the tank to provide constant heat and agitation. Steam lines are opened on the fully charged tanks in the early afternoon, and about two hours later the solution has reached operating its temperature of 210 deg F. The stencils are suspended in the solution from specially fabricated hooks. After a 15-min washing, they are removed, rinsed in cold water, and hung for air drying. The treatment does a top-notch job of cleaning faces, edges and connection wires of the stencils.

Developing the most effective chemical and water mixture was a major problem. Solutions either dissolved the lead in the solders, were too weak, or required excessive soaking time. With the assistance of the C & H Chemical Co. of St. Paul, a satisfactory formula was developed consisting of 3 oz of its No. 200 and 1½ oz of No. 24 with a gallon of water. This chemical combination will be known as C&H 104 stripper. A normal week's operation requires the addition of 300 gal of water and 127½ lb of chemical.



Stencils are suspended back of the tank to be air dried after cleaning.

For AB Brake Equipment . . .

Automated Test Rack Developed

Automatic testing of air-brake control valves is technically feasible. Westinghouse Air Brake has produced an automatic test rack which, with further development, is expected to:

- Permit operation by unskilled operators;
- Eliminate decisions by operators;
- Reduce time required for tests;
- Cut testing costs.

Under AAR rules, both service and emergency portions of the control valve must be removed from the car at least once every four years for cleaning, repairs, and performance testing. The railroads handle about 900,000 valve portions each year, necessitating considerable investment in test facilities and as well as trained personnel.

The control valve has three primary functions — charging the reservoirs, applying the brakes, and releasing the brakes. Both the service portion, for normal brake applications, and the emergency portion, for shortest possible stopping distances, function through pressure differentials acting on piston-controlled slide valves and with timed pressure increases or decreases produced by orifices. While maximum brake-pipe pressure may vary from 70 to 110 psi, an operating pressure of 80 psi is common and has been selected as the basic pressure for test procedures. Valve components are adjusted to operate at differentials ranging from 1.4 to 15 psi. Typical operating cycle for a complete control valve will range from 0.06 to 0.12 sec, depending on the brake-pipe reduction. Motion of individual parts in the valve portions ranges from 0.1 to 0.8 in.

The test specification insures that the valve will perform satisfactorily when coupled in a train. Testing of control valves has been done by manually or pneumatically positioning valve components and measuring the time required to increase or decrease reservoir pressures through the orifices in the valve and its components. Additional tests determine whether various components will operate when subjected to predetermined pressure differentials.

Test limits of the manual test rack are usually stated for the operator as pressure increases or decreases within a specified period of time. A test is accomplished by operating diaphragm cocks in a prescribed manner. Pressure changes are observed on the various gages, and, if timing is important, gage and timer readings are observed simultaneously.

Accuracy of the tests resolves itself to the accuracy with which a man can read pressure gages during a static test, or read a timer and one or two pressure gages during a dynamic test. Accuracy, in addition to purely mechanical considerations, depends on the skill and training of the operator. Total time required is also a function of the operator's training.

Design and Construction

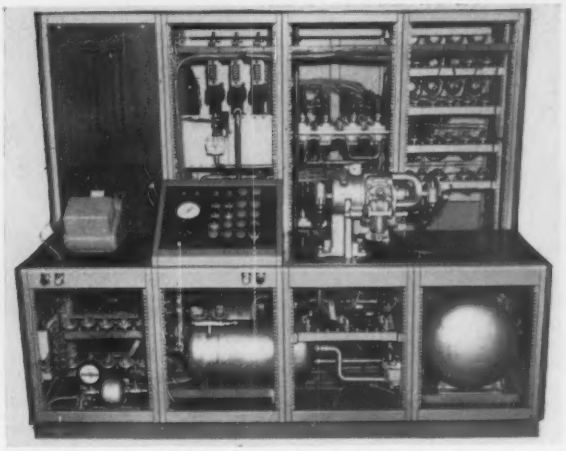
The initial approach to design of an automatic test machine was a study of the manual test rack and the test codes for the service and emergency portions. Measurement of the variables—time, pressure, and flow—presented the greatest problems. Test specifications typically establish limits on air pressure, air flow, operating pressure differentials, and time. Directly or indirectly, these limits control the permissible size of orifices and ports, and control-air leaks past check valves, between lapped surfaces, and around piston rings. These limits also assure movement of various mechanical parts upon application of specified operating pressures.

Automatic rack, not yet submitted for approval, must be accepted by AAR before roads use it.

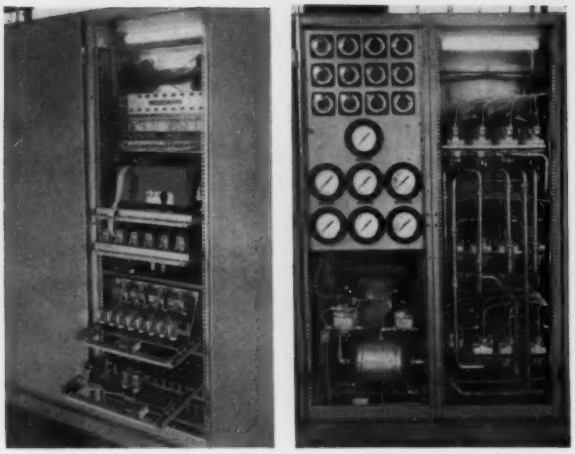
It was found that some operations, such as partially or slowly opening a diaphragm cock to prevent damaging pressure surges, were not easily duplicated in an automatic test machine with the two-state (on or off) control of pneumatic switching which was to be used. Such control is attained by converting the handle operated diaphragm cocks used on the manual test racks to remote controlled cocks. At the time the project was initiated, there also became available a two-coil three-way solenoid valve which required a momentary impulse of 15 to 20 milliseconds for actuation. The combination of a pneumatically operated diaphragm cock and a momentary impulse solenoid valve for control afforded a simple method of pneumatic switching, controllable through standard programming methods. Damaging surges were minimized by providing cushioning forces with alternate flow paths, or by restricting the rate of pressure build-up by choking flow. The conventional test specification changed considerably, but its validity was not reduced, nor was valve performance compromised.

Design studies and some experimental work on programming methods led to the use of a motorized tape reader using eight-channel perforated tape. When used in conjunction with a relay tree code translator, the eight-channel tape will produce 256 separate outputs, a sufficient number for flexible control of the electro-pneumatic and electro-mechanical devices used in the test process. The principal problem here was to properly time the tape reader and code translator so that at any code position on the tape, and during the motion of the tape to that code position, only one discrete output pulse was obtained. This pulse had to be of sufficient duration to operate the solenoid valves and other electro-mechanical devices without the use of repeater relays. There are approximately 25 tests in each specification. It has not been found practical to determine to what degree a control valve passes or fails each test. With the design philosophy that "go

From a paper entitled "Automated Testing of Railway Freight Brake Control Valves" presented by Messrs. P. W. Brath and E. T. Skantar of the Westinghouse Air Brake Company before the ASME-AIEE Railroad Conference at Pittsburgh, Pa., on April 21.



Four sections are electrical controls and read-out (left); control turret and flowmeters; diaphragm cocks; and pressure switches.



Rear of cabinet shows tape reader and relays (left), and banks of pressure switches and timers (right). Valve test takes six min.

or no-go" results would be satisfactory, pressure and flow determinations by fairly simple methods of automation were possible.

The pressure switches are single-set-point types, with a continuously adjustable measuring range of 0 to 80 psi, and are generally used with automatic reset timers. Unlike the usual rotameter installation in which the flow path remains unchanged, flowmeters (rotameters) used in the automatic testing have variable paths, along with orifices and other restrictions which differ for every portion of the valve undergoing measurement. Restriction and friction change with every flow path and affect the downstream pressure at the rotameter despite the constant supply pressure.

The rotameters provide go or no-go outputs in two ways. High-range meters measuring 2 to 30 cfm have magnetically operated switches actuated by small permanent magnets attached to a float extension. The four low-range meters, measuring 0 to 30 cu in. per min, have the metal float change the inductance of a tuned circuit.

Selection of the various pressure switches, flowmeter relays, timers, and limit switches is accomplished by a function selector network which is controlled by the tape reader. Any of the various measuring devices may be connected to any other device by properly wiring the function selector network. With this arrangement, a maximum degree of circuit isolation is achieved, thereby permitting flexible use of the measuring devices.

Any test necessarily requires a comparison of results with the values or limits which are acceptable. The pressure switches, timers, flowmeter relays, or limit switches used in a particular test must operate in some predetermined sequence which is deemed acceptable. Any other sequence of operation is invariably unacceptable. Three relays in a sequential switching circuit, called the decision circuit, determine the validity of the sequency in which up to three outputs are received.

The philosophy of go or no-go testing was extended to the test-result read-out devices.

Printout of the test results can be obtained from a solenoid input adding machine. For go and no-go testing, all the operator needs to know is that the valve has passed or failed each test of the test specification. If the valve portion has passed the test, the test number is printed in black on the adding machine tape and, if it has failed, the test number is printed in red. An alternate method of test result display uses an indicating light panel which may be an integral part of the test rack, or remotely mounted. Green and red pilot lamps are arranged in the numerical order of the tests.

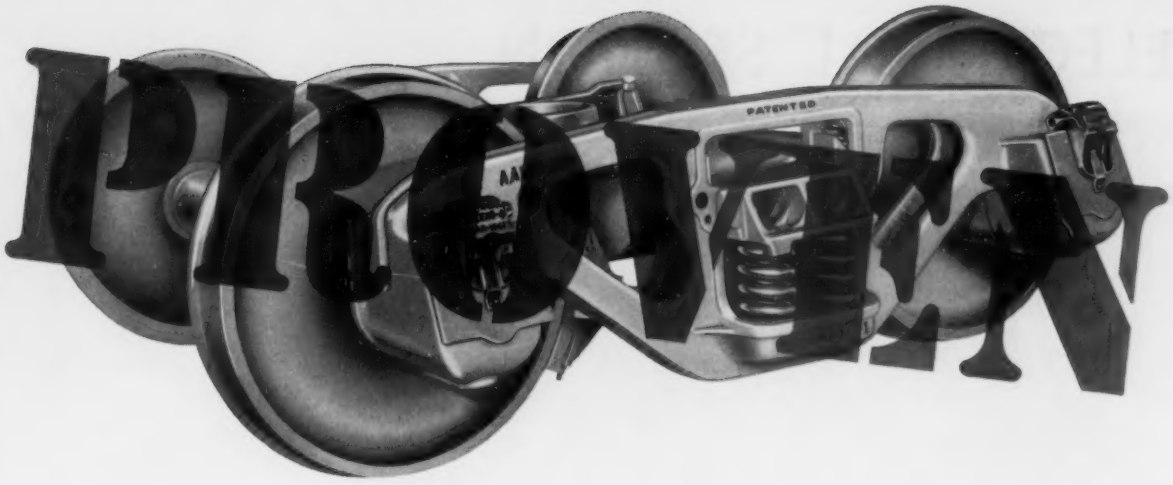
The test rack was constructed from a line of standardized steel cabinets. Where possible, electrical subassemblies are arranged on removable slide-out chassis. Generally, each of the four modules, or sections, of the rack houses a certain portion of the control equipment. One module houses most of the electrical equipment; another the flowmeters and control turret; a third, the diaphragm cocks, solenoid valves, mounting bracket and a clamp. The fourth module houses the pressure switches, timers and gages. Reservoirs are mounted in the lower portions of the modules.

Clamping of the control valve to the test bracket is accomplished by a pneumatic cylinder and lever system, providing approximately 9,000 lb clamping force along the center line of the control valve and bracket.

The control turret uses standard industrial push-button devices and includes, in addition to the electrical control, a main supply reservoir pressure gage and the control handle for the air supply adjusting valve.

The test rack may be installed in a shop so that roller conveyors bring the valve portions to the clamp area. Certain preliminary tests which it has not yet been found feasible to automate will be accomplished on a separate non-automated rack. These include tests of two operating functions and tests for the overall valve body and gasket leakage. After the preliminary tests are accomplished, the valve is moved to the automatic rack, placed on studs on the test plate, and clamped by manually operating clamp push buttons. When the clamping process is complete, the start-program push button is actuated and the testing program is initiated. The operator is then free to attend to other duties.

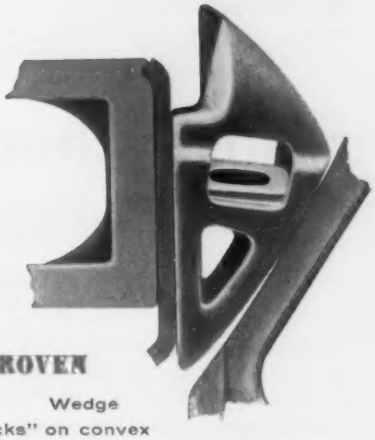
As the program progresses, test results are printed out by the printer on pressure sensitive tape. At the conclusion of the program, the operator removes the portion of the tape containing the test results from the printer, observes whether the valve has passed or failed, and then attaches the tape to the valve surface. After unclamping, the valve may be placed on a pass conveyor, or, if it failed certain tests, on a conveyor leading to a rework area.



NATIONAL C-1 TRUCK

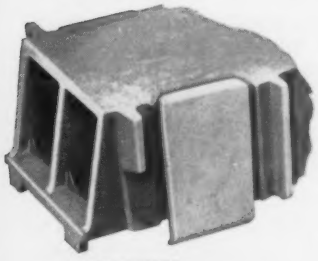
1st in longer wedge life because it's 1st in friction control design

Because it was designed right—right from the start—today's National C-1 Truck is the proven freight car truck. It has proven itself in competitive ride tests ...proven itself in years of service...proven to have the longest wedge wear life for lowest maintenance costs.



PROVEN

Wedge "rocks" on convex surface, causes slight polishing action in side frame column wedge pocket. A-648A



PROVEN

Correct hardness ratio between bolster wear plate and friction wedge gives longest life with superior riding qualities.

PROVEN

Design results in very little, if any, wear even after long service.

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Established 1868

Transportation Products Division
Cleveland 6, Ohio

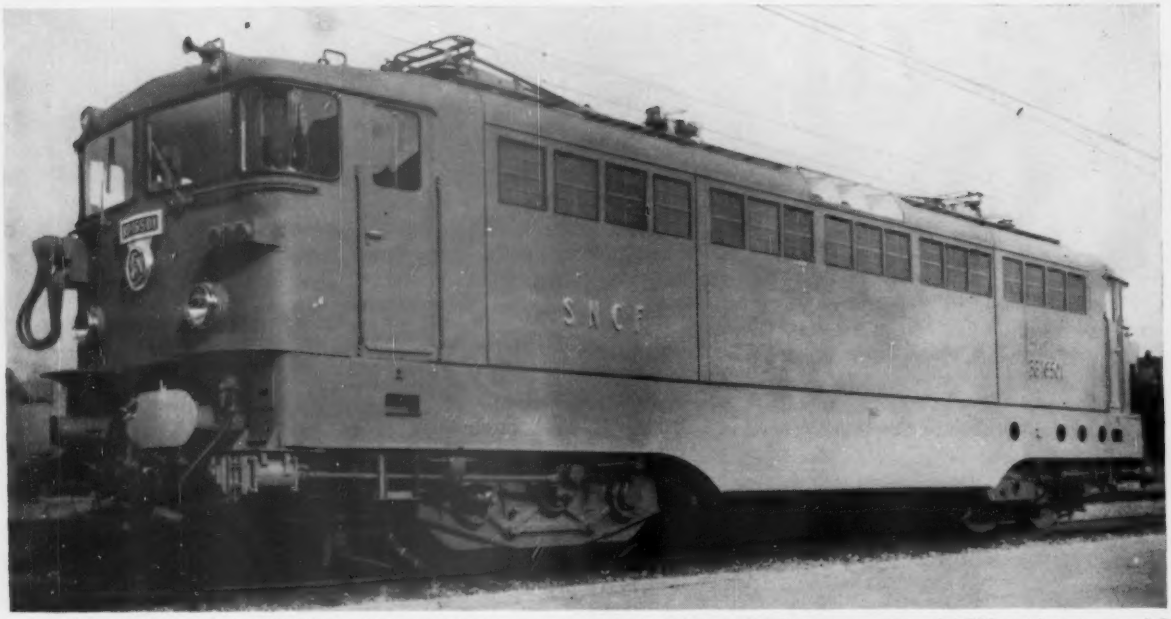
International Division Headquarters
Cleveland 6, Ohio

CANADIAN SUBSIDIARY
National Malleable and Steel Castings Company of Canada, Ltd. Toronto 1, Ontario

MEMBER

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • JOURNAL BOXES

ELECTRICAL SECTION



Rating of 3,500 hp for this 147,700 lb BB 16500 rectifier locomotive enables it to have a freight tonnage rating of 1,525 metric tons on a 1.0 percent grade. Typical passenger assignment is movement of 13 car, 606 ton train from Paris to Lille at 79 mph average speed.

French Choose A-C Electrification

Successful application of industrial-frequency a-c equipment has resulted from intensive research and development

Although the French National Railways (SNCF—Societe National des Chemins de Fer Francais) had 2,200 route-miles of 1,500-volt d-c electrification in 1945, the management concluded that widespread expansion of this d-c system would be uneconomical. After considering the economics and characteristics of 3,000-volt d-c electrification and of low-frequency a-c (16-2/3 and 25 cycles per sec) electrification, the SNCF technical staff undertook a study of a commercial-frequency a-c system. Commercial frequency in France and most parts of the world outside North America is 50 cycles per sec. As compared with 3,000-volt d-c systems, the 25,000-volt, 50-cycle, single-phase a-c system finally adopted has been found to save 25 per cent on first cost and 7 per cent on annual capital and operating costs, according to SNCF engineers. Today, the French railroad system has 4,000 route-miles of electrification—16 per cent of the total route-miles—and these electrified lines handle half of all the freight and passenger traffic in France. By 1963, an additional 700 route-miles will be under catenary, and electric locomotives and trains will be handling 63 per cent of all French rail traffic. All recent electrification and planned expansions are with 25,000-volt, single-phase, alternating current a-c distribution.

Initial doubts about the effects of widespread commercial-frequency railroad electrification on the public utility networks with respect to phase unbalance and poor power factor, and harmonics resulting from the operation of rectifier locomotives have proved groundless. Substation investment for the a-c system is only one third that for d-c systems because substations are less complex and fewer in number. First cost of the catenary system is about 20 per cent less for the a-c electrification. Only about half as much copper is required, and construction of high-voltage transmission lines can be minimized. High voltages do require increased clearances between fixed structures and live electrical parts, but these problems, even in tunnels, have been solved without undue expense. Insulated horns on pantagraphs have made it possible to avoid some expensive clearance changes.

A big question in the initial phase of

(*Continued on page 40*)

Based on a paper, French Technical Advances in the Field of Railway Electrification by F. Nouvion, presented at the ASME—AIEE Railroad Conference in Pittsburgh on April 21.

Too much brush breakage?

These switchers were death on brushes ...'til the road tried NATIONAL TRADE MARK

M. HENIKA

PROBLEM: Road switching locomotives broke hundreds of brushes per month because of severe vibration.

RECOMMENDATION: "National" Brush Grade DE-3.

RESULTS: Not one report of brush breakage in the following twelve months.

Contact your "National" Brush Man

"National", "N" and Shield Device, and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY
Division of Union Carbide Corporation • 270 Park Avenue, New York 17, New York
IN CANADA: Union Carbide Canada Limited, Toronto

UNION CARBIDE

these postwar electrifications concerned motive power. The SNCF has experimented with all possible types of locomotives powered by alternating current. According to F. Nouvion, SNCF director of electric traction research, "nothing can compete with the overwhelming superiority of the mercury-arc rectifier locomotive." The a-c electrics consistently outperform their d-c counterparts.

The three principal types of ignitron rectifier locomotives in France all have four-wheel trucks and are

- Series BB 12000 with a 3,360-hp continuous rating and weighing 185,000 lb, first built in 1954 for freight and passenger service; One hundred thirteen are in service and 35 are on order.
- Series BB 16000 with a 4,920-hp continuous rating and weighing 185,000 lb, first built in 1958 for heavy passenger service. Thirty-seven are in service and 14 are on order.
- Series BB 16500 with a 3,500-hp continuous rating and weighing 147,300 lb, first built in 1958 both for freight and passenger service. Forty-three are in service and 162 more are on order at the present time.

Currently 354 locomotives are or will be equipped with a total of 2,070 ignitron tubes. Fifty of the BB16500 locomotives on order will have "excitrons" and be fitted for regenerative braking. An experimental 5,000-hp locomotive has been operating successfully with silicon power rectifiers. This is the most spectacular application of semi-conductors ever made to rolling stock. Currently, the SNCF rates the mercury arc rectifier as superior to the semi-conductor on the basis of simplicity, maintenance, and reliability of operation. However, it is hoped (and almost expected) that technical progress will make the semiconductor more competitive in the future.

Latest Locomotive

The BB 16500, which is the newest design, has proved to be the most economical of the general-purpose electric locomotives. The mass-produced trucks are each equipped with only a single traction motor. A gear shift makes it possible to change the unit from a freight to a passenger locomotive in only a few minutes. Maximum speed for freight service is 56 mph; for passenger service, 93.5 mph. Study showed that equipment for shifting gears while the locomotive was running would be more expensive than could be justified by possible operating advantages. Units must be brought to a stop to effect the gear change.

Tests on several of the BB 16500 locomotives with all types of rail conditions show an average starting adhesion of 36 per cent, which decreases to 30 per cent at 6 mph and is still 29 per cent at 31 mph. With good rail conditions, adhesions of 40 per cent at 25 mph are obtained regularly. Coupling of the two axles on each truck to a single d-c motor is but one of the reasons for the excellent adhesion characteristics.

While total locomotive weight has been reduced from 185,000 lb in 1954 (BB 12000) to 147,700 lb in 1958 (BB 16500), today's BB 16500 is rated as giving 20 per cent better results than 1954's BB 12000. According to the SNCF's director of electric traction research, a locomotive of conventional design would have to be a 4,500-hp unit weighing 13 tons more to equal the performance of the 3,500-hp BB 16500.

(*Continued on page 54*)

Super Power for Super Railroads

Recent Railroad Conference sponsored by ASME and AIEE in Pittsburgh heard a great deal about possible electrification of U.S. railroads and the progress being made overseas. John W. Barriger, president of the Pittsburgh & Lake Erie, was one of the speakers. Mr. Barriger, an early advocate of dieselization, spoke of the promise which electrification now holds:

"It seems again appropriate to talk about super power for super railroads. Super power means 10,000 to 15,000 hp electric locomotives using central station power. Super railroads denote intensively improved and developed main lines of great regional or even transcontinental systems . . .

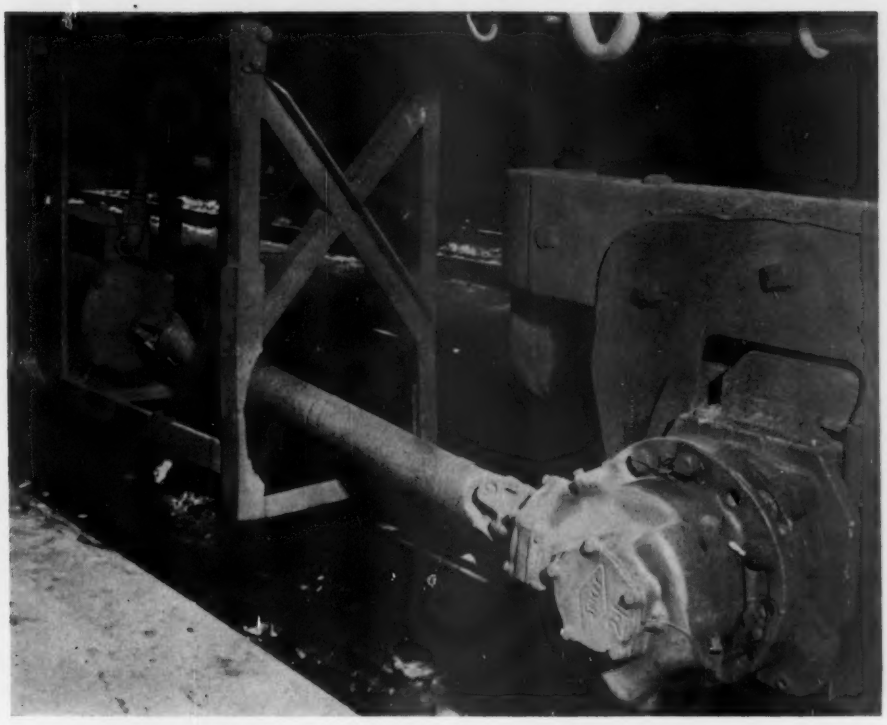
"I advocate a type of future motive power which I believe will prove as much superior to the diesel electric locomotive as the diesel was to the reciprocating steam engine . . . If Congress will permit privately owned railroads to have a bright future, electrification will play the same great role between 1965 and 1980 that the diesel did between 1945 and 1960.

"Use of 25,000 or 30,000 volt, 60-cycle power with modern means of current rectification and the present d-c traction motor will provide the technical foundation of widespread future economical railway electrification . . . The daily operations of the American railroads now require a fleet of nearly 30,000 diesel locomotives containing portable power plants having an installed capacity equal to over one-fourth of that of all of the nation's central power stations.

"Unfortunately the intermittent and average less-than-capacity use made of this impressive total of mobile power plants produces a low 'power factor' for each locomotive unit and the total group . . . The chronically unsatisfactory fiscal position of the railroads makes them increasingly conscious of cost . . . It seems a paradox that no railroad maintains any records to show the magnitude of its electric power production on locomotives, or the actual cost of this power in cents per kilowatt hour . . . It would seem that this should be a useful comparative cost factor for mechanical, operating and executive officers to have. Its measurement would require only the installation of watt-hour meters on locomotives.

"Alongside today's great turbo-generator, with a maximum of nearly half a million kva output and a total production cost of 2 mils per kwh, even a 2,400-hp diesel engine is a small-capacity, high-cost producer (*Inquiries lead Mr. Barriger to believe that power is generated on diesel locomotives for from 4 cents per kwh under favorable conditions to 10 cents per kwh and higher under unfavorable conditions—Editor*).

"The actual electric power utilization of the fleet of 40,000,000 hp of diesel locomotives now in service probably does not exceed 18 percent of rated continuous potential output. The power demands of fleets of electric locomotives and multiple-unit cars, with a generating capacity of only about 20 to 25 percent of the aggregate service potential, represents a partial offset to the capital cost of providing the power transmission system for an electrified railway . . . The difference in the cost of electric power generated on the locomotive compared with that made in a large stationary plant when related to the annual power requirements of super railroads, will be found to represent an amount that will be sufficient to pay the interest, depreciation and maintenance of the distributing system for maximum density lines, and leave a balance sufficient to represent an adequate return on the investment required to build these distribution systems. . . . Unit costs of all-electric locomotive investments and maintenance are also less, and availability and utilization are higher than is possible for diesel motive power."



Spicer drive unit was mounted on journal housing of inboard axle of baggage car truck. The generator is cradled in frame constructed of angles. Initial drive shaft difficulties have now been solved and compact generator units are operating satisfactorily on 29 cars.

By L. E. Legg

C&NW 12-Volt Lighting Is Economical

A 12-volt lighting system installed and tested in baggage car 8616 over two and one-half years ago by the Chicago & North Western (RL&C, Sept. 1957, p. 70) is now standard equipment on 29 of the road's baggage cars. Economies effected have produced a total annual saving of more than $15,000 over the standard 32-volt cars, not including expected savings resulting from the use of nickel-iron-alkaline batteries.

The C&NW 12-volt baggage car electrical system consists of an Edison A6H battery of 255 amp-hr capacity charged by a Safety Industries 1.5 kw, 15-volt, 2-phase inductor alternator through two bridge power rectifiers. The alternator is capable of continuously delivering a rectified output of 108 amp at 14 volts. It has no slip rings, brushes, commutators, polarity changer, moving contacts, or rotating windings.

The alternator is driven by a Spicer positive gear drive. Power is transmitted from the end of the axle through a coupling shaft to the gear unit and then horizontally to the alternator by a propeller shaft. The inductor- alternator is cradled underneath the car, and the voltage regulator and other electrical equipment are in a metal cabinet inside and at one end of the car. Cost of installation is about one-third that of conventional equipment, and gross weight is reduced by about 60 per cent.

A few changes in the installation as originally made now provide a nearly trouble-free mechanical system. A heavier balanced Spicer shaft is used. A gear ratio of 3.7 to 1 instead of the original 5.28 to 1 will be used on future applications. This change minimizes mechanical wear and provides sufficient charging. Lack of ventilation caused overheating of the charging equipment in the cabinet above the battery compartment. This has been eliminated by scoop-syphon ventilator. The double-end cast-iron scoop attached to the side of the car takes air while the car is operating in either direction. The scoop narrows down in the center to a tube piped to the inside of the cabinet. Air velocity

(*Continued on page 47*)

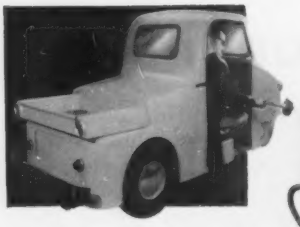
Comparison of annual Costs of Operating C&NW 12-Volt Baggage Cars and Standard 32-Volt Cars.

	32-volt system	12-volt system
Inspections (30 days)	$ 15.83	$ 7.91
Lamp renewal	27.30	13.19
Generator	25.44	66.58*
Battery flushing	31.66	7.91
Drive shaft (propeller)	—	9.13
Spicer drive	—	31.52*
Coupling shaft	—	2.72
Regulators	17.14	—
Belts	372.89	—
Batteries freeezing	182.60	—
Total	$672.86	$138.96

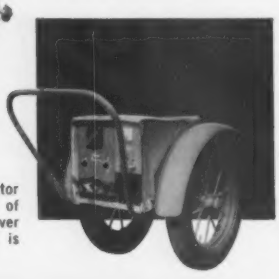
* Excessive costs due to shaft difficulties now corrected.

Ventilator, operating on syphon principle, has solved problem of overheating of regulator.

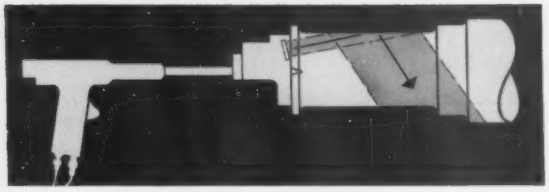
Mr. Legg is electrical engineer, C&NW.



The new Sperry Journal Test Car is a complete inspection unit. Driving from journal box to journal box, an operator can test over six hundred axles a day.



Sperry's new mobile flaw detector not only tests axles in or out of the shop but can be used wherever accurate ultrasonic inspection is needed.



The diagram illustrates the path of angled sound waves from one of the probe's six crystals . . . shows how it probes all the most critical axle areas.

Trouble Shooter ...With an Angle

Only Sperry's exclusive angle beam technique ultrasonically inspects the most critical areas of axles generally left unchecked by other test methods. And Sperry's angle beam search units make it possible to thoroughly inspect all diameter axles with the same probe.

Operation is simple. A green light signals when contact is made. A red light and an alarm buzzer signal when a progressive fracture is located. Yet the harmless structural variations inherent in many axles are not misinterpreted and thus costly dismantling for verification is avoided.

Sperry
ULTRASONIC TESTING

INDUSTRIAL X-RAY

SPOTFLUX
MAGNETIC PARTICLE

Sperry Products Company

DIVISION OF HOWE SOUND COMPANY

Shelter Rock Road, Danbury, Connecticut

How Armco stops many wheel problems before they start

Armco metallurgists keep close check on residual stresses, flow patterns, soundness, and possible defects in Armco Wrought Steel Wheels. What they learn guides Armco production men in adjusting manufacturing procedures for maximum wheel quality, fewer wheel problems for you.

Armco can help you prevent problems with wheels in service, too. A special section of Armco's new wheel catalog tells how to get the most service from wrought steel wheels. Fill in and mail coupon for a free copy of this catalog.

Reflectoscope testing of diesel wheels is a non-destructive quality control procedure that enables Armco Metallurgists to detect internal discontinuities in wheels, such as abnormal non-metallic inclusions. The result: Better wheels.

Strain gages measure residual stresses in wheels. They're first mounted on intact wheels. Then small sections of the wheel are cut out. Readings taken before and after cutting are used to calculate residual stresses. Results enable Armco to control manufacturing so that stresses are favorable for long, safe service.

Deep etching permits Armco metallurgists to check soundness and flow patterns in wheels. This information is used to maintain melting, forging and rolling procedures to give top wheel quality.

New steels are born at Armco

ARMCO STEEL CORPORATION
1780 Curtis Street, Middletown, Ohio

Please have your nearest sales office send me a copy of "Armco Wrought Steel Wheels."

NAME_____ TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE_____ STATE_____

ARMCO STEEL

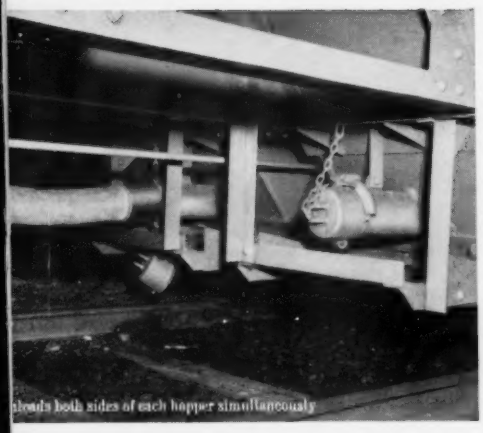
Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

Now railroads can offer shippers of granular or powdered commodities faster, simpler pneumatic unloading. One man following three simple steps can hook up this pneumatic unloader in a matter of seconds. Just unscrew the unloading cap, open the air inlet and insert the suction hose to complete the operation. Additional features include: simple fool-proof control by damper adjustment and fixed metering; no special tools required to

One man does the job in 3 simple step

ACF SHIP-O-MATIC: THE "ONE

Sales Offices: New York • Chicago • St. Louis • Cleveland •



operate; pneumatic outlets adaptable to any size vacuum conveyor system; operates with pneumatic or gravity unloading interchangeably. ACF "SHIP-O-MATIC" Covered Hopper Cars are available in 4 sizes: 2,000, 2,900, 3,200 and 3,500 cubic feet. Contact any ACF sales office for information on price, design details, delivery.

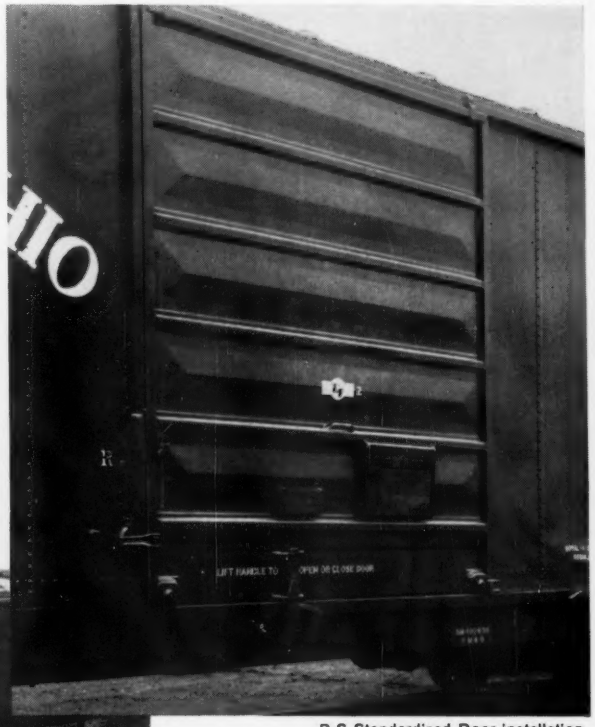
AMERICAN CAR AND FOUNDRY

Division of ACF Industries, Inc. • 750 Third Ave., N.Y. 17, N.Y.

MAN UNLOADING HOPPER CAR"

Philadelphia • Washington, D.C. • San Francisco.

GM&O upgrades Box Cars uses standard 8 foot **P-S** door for minimum re-work, maximum economy



P-S Standardized Door installation.

Upgraded GM&O box car—like-new throughout.

The recent upgrading of a group of service-worn GM&O box cars highlighted the major economies P-S freight car parts offer railroads. The upgrading program called for like new, Class A equipment, and within close economic limits. P-S Standardized Side Doors fitted the specification perfectly. Here's why:

- The P-S design was easily adapted to the car. Required minimum re-work even though side door opening was increased from 6 to 8 feet.
- P-S Box Car Side Doors offered low first cost, thanks to standardized production.
- P-S welcomed the opportunity to assist the railroad builders in adapting the P-S door.

Of course, in addition to these immediate cost benefits, the GM&O can look forward to many years of trouble-free service from their P-S Side Doors.

Check into the complete line of P-S Freight Car Parts before you specify for any rebuilding or repair programs—you'll be glad you did.

PULLMAN-STANDARD

A DIVISION OF PULLMAN INCORPORATED

200 SOUTH MICHIGAN AVENUE, CHICAGO 4, ILLINOIS

BIRMINGHAM • PITTSBURGH • NEW YORK

J. C. Fennelly Co., San Francisco Representative

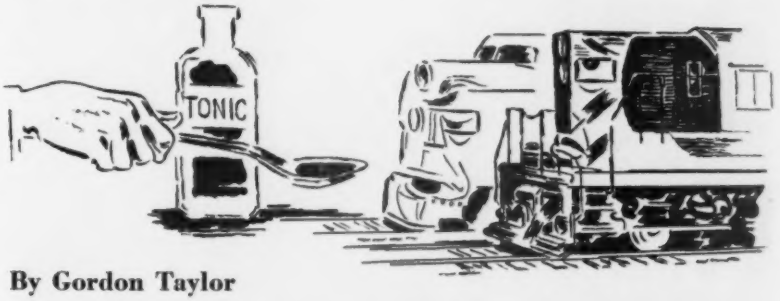
(*Continued from page 41*)
through the scoop varies with the train speed and syphons the warm air from the cabinet.

Painting the interior of the car glossy white increased the illumination provided by the eight 25-watt bulbs well above that considered adequate to pass certain state requirements. No change was made in the bulb size, because the system was designed to give a minimum drain on the 255 amp-hr battery. A few cases of depleted batteries were caused by failure to turn off lights when leaving car. Installation of a four-hour time switch was considered, but this was decided to be impractical.

The cars are now assigned for express or storage mail movements on through runs. Invariably, when the cars return, batteries are fully charged. Operation of the Safety inductor alternator, changing equipment, and batteries has been excellent. Snow and ice seem to have no effect on operation of the Spicer drive. The cars have been in service through Illinois, Iowa, Michigan, Wisconsin, South Dakota, Nebraska and Minnesota.

From the Diesel Maintainer's Note Book

Cures for Spring Fever



By Gordon Taylor

Neglect of small things can often be the cause of diesel failures which result in bad train delays. This note relates the failures of two locomotives which have occurred recently.

Case 1. A four-unit freight diesel slipped down on Limestone Hill because it lacked power. The second unit, a Geep, simply would not haul its share of load. Engine speed on that unit would respond to the throttle on the lead unit, but the generator did not seem to be sending current to the traction motors. It was found that the battery-field and the shunt-field contactors would not pick up to excite the main generator. There was nothing that would correct the trouble. As the engineman reported it, "That unit seems to have a case of the 'tired blood' they talk about in the TV commercials. I don't know how to pep it up, how to make it get over this spring fever.

Engineman Murphy and his conductor then decided to reduce tonnage and double the hill. To do this, they would back to a siding where they could leave part of the train without blocking the main line. When they started to back up, the main generator on the second unit suddenly got busy and went to work. This brought up a new question: why would that unit load up in reverse but not when going forward? The engineman could not answer that question, but went about doubling the hill. The train was about three hours late.

When the trouble was reported at the end of the trip, the electricians knew their problem was to find something that would interfere with the action of the battery and the shunt field contactors. Doc Watts, the electrical foreman, pointed out that "the closing of these field contactors first requires the closing of interlocks which are operated by the closing of the series power contactors. Let's check the power contactors and see if they are closing."

A quick check revealed that the series contactors would not close. Consequently, the generator could not deliver power to the traction motors. The question then became, what is interfering with the series contactors?

"Those power contactors are energized through interlocks on top of the reverser in that unit," Doc said. "The C-D interlocks set up the power circuit for the forward movements of the locomotive, and the F-E interlock does the same thing in the power circuit for reverse moements. We should check the reverser interlocks."

When the interlocks were checked, it was found that the C-D interlocks were dirty and burned. The contacts were then polished and adjusted. In a few minutes the unit was back in business. The sad part of this case is that the delay could have been avoided had a maintainer made a more careful inspection when the unit was in the shop for mileage maintenance two days before the failure.

Case 2. An FP-7 unit ran from one end of the railroad to the other, alternately loading up and failing to load —another case of spring fever. The action of the unit indicated that some control circuit was opening itermittently.

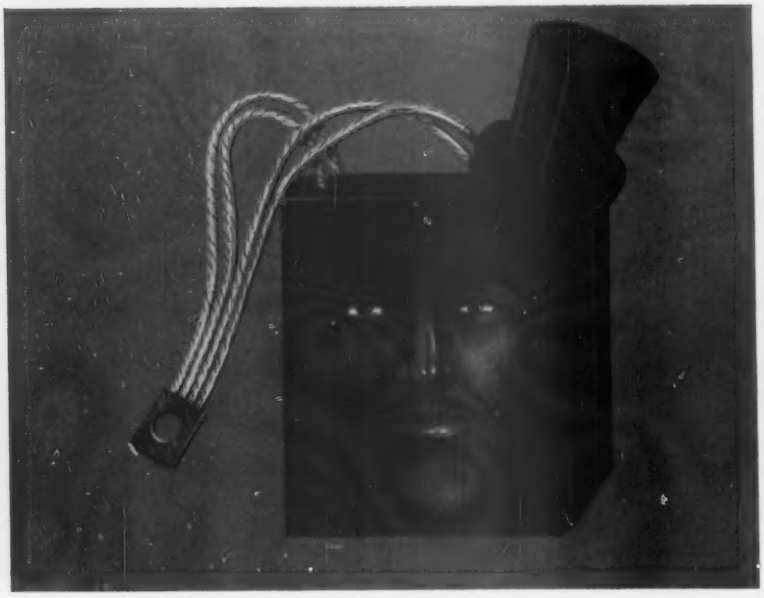
The FP-7 had been dispatched as a trailing unit behind an E-7 passenger locomotive. After operating a short distance, the trailing FP-7 seemed to be dropping its load. It was found that the enginee could be speeded up by using the layshaft, but would not come up to full speed when operated by the throttle on the leading unit.

The train limped on to the next division point, losing some time. A mechanic checked the locomotive and at that time the engine on the FP-7 responded properly to the throttle on the E-7. Under these circumstances, the FP-7 was allowed to go through.

A short time later, the unit proved that electrical control defects almost never fix themselves. The unit again developed the unloading trouble, and the engineman radioed the next division point to have an electrician meet the train. The electrician had only a

This series of articles is based on actual experiecnes of men who operate and maintain diesel-electric locomotives.

WANTED



For Contempt of Commutators

. . . by committee investigating railroad maintenance costs. A suave, sophisticated air hides suspect's sadistic and larcenous nature. Record of previous arrests includes bar burning, grooving, and goughing — all involving highly-valued diesel-electric commutators.

Any railroad employee knowing whereabouts of suspect should immediately contact Stackpole Carbon Company, St. Mary's, Pa., and collect his reward — a personal evaluation of his diesel-electric brush needs based on obtaining maximum mileage consistent with smooth, burn-free commutation.

STACKPOLE *diesel-electric* **BRUSHES**

profitable operation through optimum commutation

electrical contacts • seal rings • welding & brazing tips • graphite bearings
electrochemical anodes • voltage regulator discs • electrical & electronic components
rocket nozzles

few moments time, but he thought that perhaps the jumper cable between the units was defective. He changed the cable, and the unit again responded to the throttle. The unit was again permitted to continue on the train.

Shortly after the train left that point, it became apparent that the jinx was still aboard. The unit again failed to develop full power, but for the first time it was noted that the engine did not go to idle. The engineman noticed that the unit would not load up beyond throttle 4. At last someone had said something definite about the trouble.

The unit was cut out at the next division point for a thorough inspection. The statement that the engine "would not load past throttle 4" was a clue that led to a complete check of the solenoids in the engine governor. It was found that the No. 2 wire in the governor had broken at the point where it was soldered to the contact pin in the cable plug which carries the control wires into the governor. The No. 2 wire is the one that energizes the "B" solenoid.

If you will check the Engine Speed Chart in the Operating Manuals, you will find that the "B" solenoid first comes into play on throttle 5. It is the solenoid that adds 300 rpm to engine speed on the older engines. On the later engines, solenoid "B" adds 320 rpm to engine speed. The "B" solenoid must be energized in all throttle positions from 5 to 8, inclusive, to maintain proper engine speeds.

This case of trouble could have been quickly solved if the maintenance force had definite and exact advice as to the nature of the trouble. The last engineman made the statement that quickly led to a solution of the trouble.

The broken wire in governor cable plug sometimes made contact, depending on locomotive vibration. Out of this case came the discovery that the governor cable was being used as a handhold by men climbing over the diesel engine while making inspections. This placed a strain on the wire connections in the cable or flexible conduit. It was necessary to provide an angle-iron bracket to shield and support the governor cable. This eliminated the possibility of having the cable broken or disturbed by maintainers and inspectors.

This note shows that if you take care of the little things properly, the big ones generally take care of themselves.

(*Continued from page 8*)

fact that they have not been changed, while the TTX fleet has grown from 400 to more than 4,000 cars. All together, the AAR reports that currently there are about 11,000 piggyback cars in service or on order. Many sub-changes have been made, however, in the TTX fleet, Mr. Wightman said.

The first cars were 50 ft and 75 ft long and had cumbersome jack-and-chain tiedowns. Today, 90 per cent of the company's cars are equipped with the ACF hitch which Trailer Train's mechanical committee helped develop. Similarly, guide rails, bridge plates, floor construction, as well as many other features have been improved and refined. Even the length of cars has been changed, all the newest units being 85 ft long.

Trailer Train's mechanical committee Mr. Wightman says, is presently working on lower-level designs which may meet most of the clearance restrictions now facing some of our members. If this problem could be completely solved by some form of depressed floor (and this is not as simple as it sounds) would the resulting car be efficient for containers? Mr. Wightman queries. The question of whether the car should carry one or two trailers is complicated by the possibility that longer trailers may come into widespread use.

TTX is constantly searching for new equipment and improvements in existing equipment, according to Mr. Wightman, and would welcome uniformity in equipment. But the design of such equipment presents many challenges. Six which Mr. Wightman lists as ways to a standard piggyback car are:

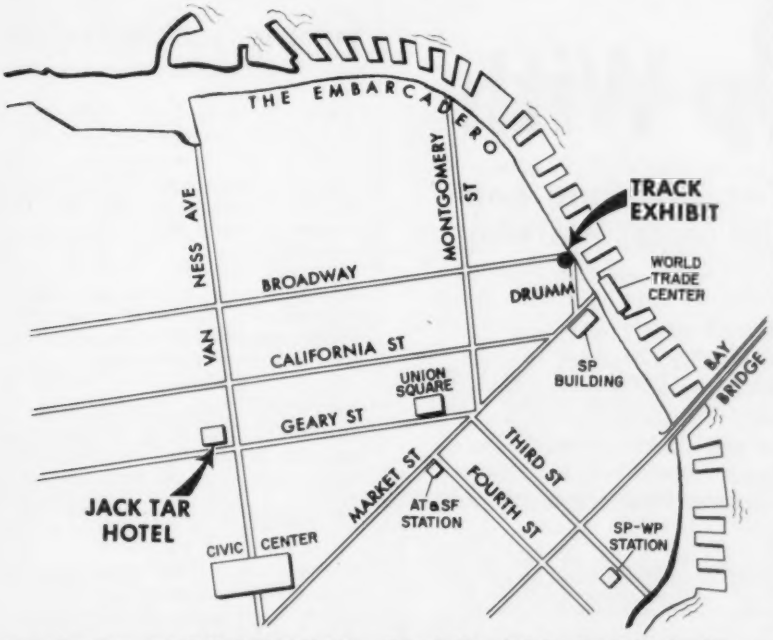
- 1. It must be able to carry conventional highway trailers of all types—present and future—without modification;
- 2. It must be able to carry conventional containers and/or demountable cies;
- 3. When loaded, the car must be low enough and narrow enough to meet all overhead and curve restrictions;
- 4. It must provide maximum operating efficiency in terms of loading, unloading, and other terminal costs;
- 5. It must be economical to build and maintain, and
- 6. It must be compatible with at least the majority of piggyback equipment now in use.

G.E. Will Build Main Line Diesels

High-horsepower, high-speed diesels for main line service will be built by General Electric, R. J. Cordiner, chairman, announced at the annual meeting. Previously GE has sold only electrics, gas turbines, and light diesels for domestic applications. The locomotive to be offered to U.S. roads is the 2,500-hp U25B which as been in test service for over a year (*see page 32*). No deliveries could be made before 1961, according to the GE chairman.

The four-axle road switcher weighs 260,000 lb and is 60 ft 2 in. long. It has a 16-cylinder, four-cycle, turbocharged engine. Carbody is completely pressurized.

San Francisco Meeting and Exhibit Sites



Annual meeting of AAR Mechanical Division will be held at Jack Tar Hotel, San Francisco, on June 14, 15 and 16. Railway Electrical and Mechanical Supply Assn. will hold exhibit. At press time, 45 firms had booths at the Jack Tar. Demand for trackage found REMSA trying to get more space at Drumm and Broadway, or even to find another outdoor exhibit area.

NEW-Sudsy Detergent Cleans like Crazy!

New Oakite Liqui-Det renovates head lining, upholstery, trim, floors and carpet alike ... frees the entire car interior from ground-in grit and clinging grime, and does it gently, safely, thoroughly.

Concentrated for maximum economy, Liqui-Det forms a sudsy solution instantly in hard or soft water. Ask the local Oakite man to demonstrate. Or, send for details. Oakite Products, Inc., 46 Rector Street, New York 6, N.Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS · METHODS · SERVICE
SCIENCE
in our 51st year

Export Division Cable Address: Oakite

Technical Service Representatives in Principal Cities of U. S. and Canada

HEAVY DUTY PUNCH
Fast, versatile punch punches 34 patterns without tool change. 2½" hole through 1½" steel or a number of smaller round or shaped holes. Handles 65 ft. stock.

GAP TYPE PRESS
For forming, bending, flanging, pressing. 250-ton capacity.

GUILLOTINE BAR SHEAR
For production or short run shearing of rounds, squares, angles and bars without changing tools. 43 to 300 ton capacities.

VERTICAL BULLDOZER
For hot and cold pressing and forming of heavy metal. Can also be used as press brake. 400-ton capacity.

HORIZONTAL BULLDOZER
200-ton press features rapid production and return speeds for heavy forming, flanging, bending.

Tool Up With BEATTY *For Efficient Low Cost Metal Working*

Savings in metal working start with Beatty machines . . . job-engineered equipment that is especially designed to speed work flow and provide dependable, accurate performance — on the production line or on short run jobs or repair work. Beatty machines are built rugged and rigid to give more low-cost, maintenance-free production per man-hour; earn more profits per square foot of floor space and dollar investment.

WRITE FOR FREE DESCRIPTIVE LITERATURE on some of the BEATTY LINE of metal working equipment: Shears, Punches, Presses, Spacing Tables, Bulldozers, Stamping Trimmers

BEATTY MACHINE & MFG. CO.
962 150th Street, Hammond, Indiana

Personal Mention

Boston & Maine.—*Boston, Mass.:* PAUL C. DUNN, assistant general manager — mechanical, appointed chief mechanical officer, reporting to D. A. BENSON, vice-president-operations. EARL C. CONE appointed assistant chief mechanical officer. Formerly superintendent of shops, North Billerica, Mass.

Florida East Coast. — *South Jacksonville, Fla.:* J. SIMS appointed general master mechanic, Bowden shops. Formerly master mechanic at Miami.

Milwaukee. — *Milwaukee, Davies Yard:* H. R. ANDERSON appointed district general car foreman, succeeding H. A. GROTHE, retired. L. P. BARRY appointed assistant district general car foreman in Milwaukee Terminals, succeeding Mr. Anderson.

Northern Pacific. — *Seattle, Wash.:* C. H. MOREAU appointed master mechanic, Tacoma division, succeeding G. G. FITZGERALD, retired. *St. Paul, Minn.:* C. J. WIRTH appointed master mechanic, St. Paul, division, succeeding Mr. Moreau. *Livingston, Mont.:* L. R. EARL appointed master mechanic, Rocky Mountain division, succeeding Mr. Wirth. H. H. RAMER appointed assistant master mechanic succeeding Mr. Earl. Mr. Ramer formerly general foreman, Mississippi street diesel shop, St. Paul.

Rock Island.—*Chicago:* J. R. OSMAN appointed superintendent motive power. Formerly master mechanic at Silvis, Ill.

Southern.—*Atlanta, Ga.:* JAMES T. FREEMAN appointed general foreman. Formerly foreman car repairs at Spartanburg, S.C.

Supply Trade Notes

LEWIS BOLT & NUT CO.—*D. K. Knudtson* appointed vice-president.

■

CARRIER CORP.—*Henry W. Kuklinski* appointed engineering manager for transportation air conditioning and refrigeration equipment.

■

VAN PRODUCTS CO. — *Pilot Packing Co.*, 1 Water st., New York 4, and 122 S. Michigan ave., Chicago 3, appointed exclusive distributors for Van-Air.

■

AMERICAN STEEL FOUNDRIES. — Western sales office of Transportation Equipment Division has been moved from Denver, Colo., to 1557 Russ Bldg., San Francisco 4. *Richard T. Coyne,* district sales manager, in charge.

■

GENERAL ELECTRIC CO.—Two new GE methods for rewinding and rebuilding traction motors include encapsulating motor parts with epoxy resins by "bag molding" for commutating coils and a vacuum pressure impregnating system for the armature. Facilities or the processes are be-

H. R. Odell
WAB

R. B. Morris
WAB

F. B. Steele
Gould-National

WESTINGHOUSE AIR BRAKE CO., AIR BRAKE DIV.—*H. R. Odell,* district representative at New York, appointed Central District representative, with headquarters in Cleveland. *R. B. Morris* appointed district engineer, Eastern District, with headquarters at New York. *J. C. Janke,* district engineer in New York, transferred to engineering department, Wilmerding, Pa., as staff engineer.

■

GOULD-NATIONAL BATTERIES, INC. *F. B. Steele* appointed Chicago regional manager.

■

ELECTRO-MOTIVE DIV., GENERAL MOTORS CORP.—*John K. Williams* appointed assistant director of public relations.

■

NATIONAL MALLEABLE & STEEL CASTINGS CO.—*Bernard C. Yearley* appointed vice-president of newly formed, General Research, Development and Engineering Division.

■

ALUMINUM CO. OF AMERICA. — *George E. Herman* appointed manager of transportation sales. *Gilbert B. Hauser,* manager railroad section, sales development division, made Fellow, ASME.

■

ARCAIR CO.—*William Bajari* of Norwald, Calif., appointed field representative, covering 13 western states, with headquarters at Bremerton, Wash.

■

MOTOR WHEEL CORP. — *Robert H. Smith* appointed to sales staff of metal products section, industrial division.

■

WAUGH EQUIPMENT CO.—*W. K. Durbon,* vice-president, appointed sales manager of newly formed Cushion Underframe Division, with headquarters in Chicago. *F. A. Bussman,* service man, appointed assistant to Mr. Durbon, operating out of Pittsburgh, Pa.

FLEXIBLE HOSE ASSEMBLIES

Stratoflex "275" wire braid hose, with SF 426 and 435 reusable fittings, meets standard applications for railroad air brake lines. Hose is made from seamless synthetic rubber innertube, reinforced with one fabric braid and one high tensil steel braid in sizes -10 and -12. Sizes -16 and -24 are reinforced with two steel wire braids. For complete information on Stratoflex "275" Flexible Hose Assemblies, write for SF-275 mailer today.

SF3-0

STRATOFLEX Inc.

P.O. Box 10398 Fort Worth, Texas
Branch Plants: Hawthorne, Cal., Fort Wayne, Toronto
In Canada: Stratoflex of Canada, Inc.

SALES OFFICES:
Atlanta, Chicago
Cleveland, Dayton
Detroit, Fort Wayne
Fort Worth, Hawthorne
Houston, Kansas City
Milwaukee, New York
Philadelphia, Pittsburgh
San Francisco, Seattle
Toronto, Tulsa

ing installed in 15 GE locomotive repair Service Shops throughout the country. Objective of the program is a balanced improvement of characteristics affecting motor life. These include improved heat transfer, reduced vibration, and encapsulation to seal out moisture, dirt and contaminants.

■

OWATONNA TOOL CO.—*James E. Braas* appointed industrial sales engineer, in charge of specialized railroad equipment.

■

BUDD CO.—*Gordon W. Sabold* appointed assistant manager, disc brake sales, Railway division, Chicago. Mr. Sabold formerly regional sales manager, western area, Railway division.

What's New

(*Continued from page 15*)

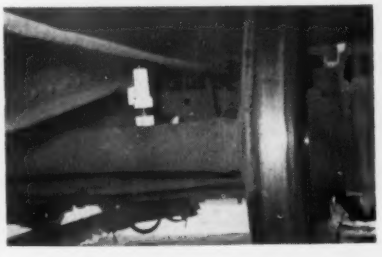
alteration or dismantling is needed. The stop is said not to fracture on impact and to require no more time to apply than changing a brake shoe. The device is AAR approved for test application in interchange. *Ajax Consolidated Co., Div. of Southern Electric Inc., Dept. RLC, 4612 W. 20th st., Chicago 11.*

Oil Condition Test Kit

Model PK4 crankcase oil test kit has, according to the manufacturer, the ability to show the definite amounts of contaminants and deterioration of the oil. Tests show whether to change oil or filter or not to change and whether an engine needs attention because of fuel or water or metal particles found in the oil. One to 12 oils can be tested at the same time. The earlier Model PK3 can be converted to the new features of Model PK4. *Gerin Corp., Dept. RLC, Avon, N. J.*

All-Copper Weld

An all-copper weld for connecting commutator risers to armature coils is said to mark the first use of tungsten inert gas arc welding for transportation motors. The process requires no solder and is said to give better protection against overload, high temperatures and dirt. It will be used in the manufacture of GE motors and generators for use on industrial type locomotives and rapid transit cars. In the process, a tungsten electrode is used to produce an arc, which is shielded by a stream of inert gas. Since the tungsten is not appreciably absorbed by the weld, the final joint between the armature coil and the commutator is all copper. *Locomotive and Car Equipment Dept., General Electric Co., Dept. RLC, Erie, Pa.*



Re-brassing Tool

The GTS wheel clamp is designed to facilitate changing journal bearings by holding the car wheel down while the journal box is being raised for re-brassing. No wrenches or other tools are required to position the tool between the wheel or axle and car sill. It is said to be safer to use because it eliminates slippage due to greasy wheels or heavy goose-necks. The clamp weighs three lbs. *General Transportation Supplies, Inc., Dept. RLC, 3340 Ravenswood ave., Chicago 13.*

One Man...
+
One Machine...
+
One Chemical...

...is all you need for the complete cleaning of an entire Diesel Truck or Block up to 13,500 lbs.!

Write or Phone...

magnus
CHEMICAL COMPANY INC.
RAILROAD DIVISION
GARWOOD, NEW JERSEY • SUNSET 9-0200
EQUIPMENT CHEMICALS METHODS

POWASERT® AUTOMATIC NAILER

Saves 5½ Man-hours per 8 hour day... on Box Car Relining

One man can reline a box car in 2½ man-hours with a Powasert Automatic Nailer. The same job with hand nailing takes 8 man-hours.

Powasert Nailers cut worker fatigue — reduce back-breaking labor which builds up costs. You can free one or two men who ordinarily do just nailing for other work.

Powasert Nailers will drive up to 50 8-penny nails a minute. Nails are dumped into the feeder-separator unit and fed automatically to the gun. Gun works by merely pressing nose against work and squeezing trigger.

Powasert Automatic Nailers pay for themselves in a short time. Call or write us today for a demonstration.

Powasert Automatic Nailers start at $1195 with feeder-separator. Operates best from 95-120 PSI clean, dry air.

United

UNITED SHOE MACHINERY CORPORATION

Dept. RC, 140 Federal Street, Boston, Mass. • Liberty 2-9100 US 9-59

Finer • Faster Markings

DN

WITH IMPROVED ENGINEERED LETTERING TOOLS

Spray it— STENCILS

Now—make each car a traveling billboard with colorful decorations that advertise your Corporate image and services wherever it goes.

Planned decorations are our business. With DEMP-NOCK Magnetized or Pressure Sensitive "SPRAY-IT" Stencils they are reproduced finer, faster, easier. Accurate and durable, this system includes trademarks, medallions, lettering, numerals—everything to make good decoration easy.

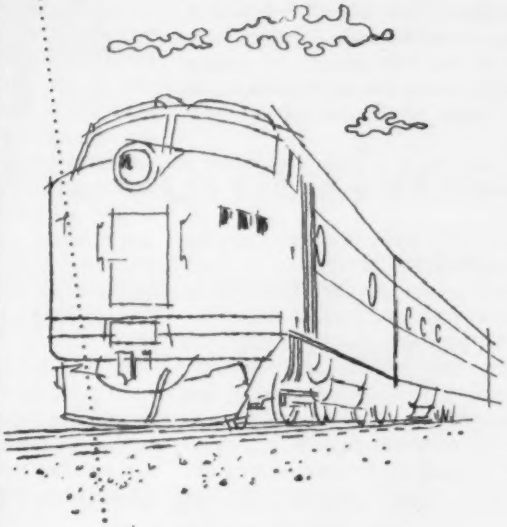
Color styling and designing available on a consultation basis.

Write now for complete information.

THE DEMP-NOCK COMPANY
21433 Mound Road • Warren, Michigan
"Engineered Lettering Systems"

DEMP NOCK

CAR BUILDERS
LOCOMOTIVE BUILDERS
SUPPLY COMPANIES



Check National HTM Castings

Strength . . . toughness . . . high machinability . . . wear and fatigue resistance—you get all in National HTM (heat treated malleable) Castings.

National also produces carbon or alloy steel castings and standard malleable iron castings.

For door fixtures, pipe clamps, anchor and lashing fixtures, cross beam stops, hopper car rope and pull castings or any component part of your product, it pays to check National's foundry facilities for quality castings and prompt delivery.

A-1577A

Established 1868

NATIONAL
MALLEABLE AND STEEL
CASTINGS COMPANY

Transportation Products Division
Cleveland 6, Ohio

French Electrics

(Continued from page 40)

On a single-phase locomotive with all traction motors connected in parallel, slipping in one motor does not affect the others. With constant voltage imposed on the slipping axle, its normal tractive-effort-to-speed relation is maintained. This is not the case with series connected motors where slipping of an axle results in voltage changes across the motor which can cause rapid acceleration of its armature.

Improving Adhesion

The SNCF has placed great emphasis on adhesion improvement. In place of sanding (see also page 32), work is aimed at removing foreign matter between wheel and rail by mechanical cleaning and by electrical sparking. Laboratory work with sparking has produced high adhesions and "promises good results in experimental operation." Sparking removes gasses absorbed by metallic surfaces, which is an "important cause for the reduction of metal-to-metal adhesion."

Direct-current electric locomotives have had their adhesion characteristics improved by installing slip detection equipment which includes tachometer-alternators on all axles and a device which compares these a-c outputs to detect axle speed differentials of as low as 1.5 mph. Circuit changes have included a resistance which is automatically connected in parallel with the armature of any slipping motor to decrease torque, and a balancing resistive bar which serves to maintain voltage at the terminals of a slipping motor and reinforce its field. Recently acquired d-c electrics have single-motor trucks, armature-shunt resistance used on motors while they are in series, and the balancing resistive bar used while motors are in parallel.

Availability of electric locomotives is 90 per cent. Costs of maintenance for modern d-c and a-c locomotives is practically the same. Daily inspection and running repairs require just over 13 man-hours per thousand locomotive-miles for both types. The BB 8100 d-c locomotives, one of which set the world speed record of 204 mph in 1955 (RL&C, May 1955, p. 62), receive classified repairs every 750,000 miles.

Despite the increasing railroad electrification, the load on the public utility system remains practically constant at all hours of the day and night. Between 1949 and 1958 railroad employment dropped from 465,000 to 360,000, while traffic increased from 70 billion to 85 billion "traffic units." Electric traction has played the major role in this increased efficiency.

Main lines are being electrified and branch lines dieselized. On a double-track line, an annual diesel locomotive fuel consumption in excess of 26,600 gal per route-mile is necessary to justify electrification. For a single-track line, the figure is 16,900 gal per route-mile.

Following the French lead, Great Britain, India, Japan, Luxembourg, Portugal, Turkey, and Russia have undertaken industrial frequency electrifications.

SALES ENGINEER

Well established firm in Midwest offers unusual opportunity to man with knowledge of railroad cars and equipment. Prefer previous sales experience in railroad field. Write, sending complete resume, photo and salary requirement — our employees know of this ad. Write Box 105, Railway Locomotives and Cars, 30 Church Street, New York 7, N. Y.

TECHNICAL TRAINING FOR RAILROAD MEN

Electrical and Mechanical Maintenance of Diesel Locomotives

Diesel Locomotive Operation

Car Work and Car Inspection

The Railway Educational Bureau
1809 CAPITOL AVENUE
OMAHA 2, NEBRASKA

WANTED: Surplus or used, E.M.D. injector plunger & bushing assemblies #5227853, #5228236 .421 diameter, GM-DD Series 110 plunger & bushings and parts. Rail, 2093 East 19 Street, Cleveland 15, Ohio.

ADVERTISERS IN THIS ISSUE

Air Maze Corp. . . . Inside Back Cover
Ajax Consolidated Company 11
Albertson & Company, Inc. 19
American Car & Foundry, Division ACF Industries, Inc. 44-45
Armco Steel Corp. 43
Beatty Machine & Manufacturing Company 50
Bethlehem Steel Company 17
Callaway Mills, Inc. 4
Dana Corp. 16
Demp-Nock Company 53
Esso Standard, Division of Humble Oil & Refining Company 9
Magnus Chemical Company 52
Magnus Metal Corp. 20
National Carbon Company 39
National Electric Coil, Division of McGraw-Edison Co. 3
National Malleable & Steel Castings Company 37, 53
Oakite Products Company 49
Pullman-Standard Car Manufacturing Company 46
Russell, Burdsall & Ward Bolt & Nut Company 30
Shell Oil Company 28-29
Sinclair Refining Company 6-7
Sperry Products Company 42
Stackpole Carbon Company 48
Stratoflex, Inc. 51
Texaco, Inc. . . . . Inside Front Cover
United Shoe Machinery Corp. 53
United States Steel Corp. . . Back Cover
Westinghouse Air Brake Company 12-13
Wilkening Manufacturing Company 14
Wine Railway Appliance Company 27

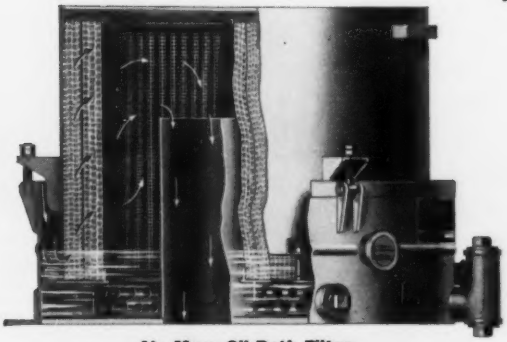
longer life

for your diesel locomotives

with cleaner intake air

from AIR-MAZE

Oil Bath or Panelbath Filters



Air-Maze Oil Bath Filter
Efficient filtration with low maintenance.

Air-Maze Panelbath Filter
Effective filtration at low initial cost.

Which should you use? *One or both of these Air-Maze filters is the economic answer to your locomotive fleet requirements. Evaluate the advantage of each filter under your operating conditions.*

OIL BATH FILTER—Removes up to 97% of objectionable dirt... has exceptionally high dirt-holding capacity... requires only semi-annual oil changes and annual removal for cleaning.

PANELBATH FILTER—Removes up to 90% of objectionable dirt. Designed to up-grade panel filtration of intake air, the PANELBATH has low initial cost... replaces 2" and 4" oil-wetted or centrifugal type panels on engine air intakes. Requires periodic servicing at 90-day intervals under average operating conditions.

Replaces panel filtration with resultant efficiency at least equal to that replaced.

The basic principle used in both these Air-Maze filters is backed by successful service on over 4000 locomotives.

For further information, contact your locomotive builder or write Air-Maze Corporation, Dept. RL-5, Cleveland 28, Ohio. (Subsidiary of ROCKWELL-STANDARD CORP.)

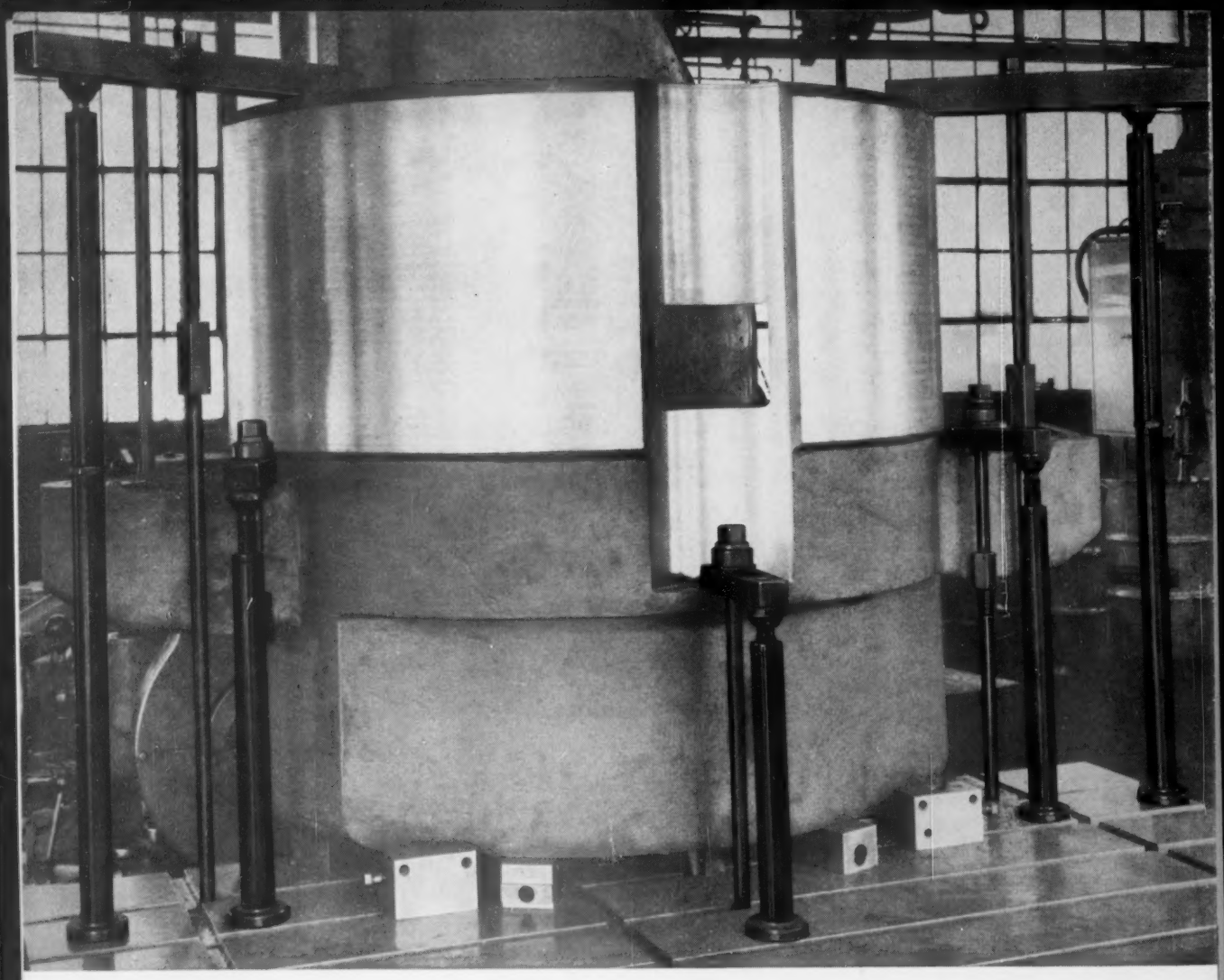
CLEANER TO POSSESS
P R I
MEMBER

AIR-MAZE *The Filter Engineers*

Subsidiary of **ROCKWELL-STANDARD** Corp.

ROCKWELL R STANDARD

ENGINE AIR FILTERS • CARBODY FILTERS • SPARK ARRESTERS • LUBE OIL STRAINERS • OIL SEPARATORS • PASSENGER CAR FILTERS



Here's how Handy Clamp and Jack Set clamps down on machining costs . . .

JACKS UP PRODUCT PERFORMANCE

USS National Seamless Mechanical Tubing helps one of our customers* do both. By using Mechanical Tubing in their clamp and jack sets, our customer finds it unnecessary to machine the ID before threading the ends; that painting requires no special preparation, and that, compared to bar stock, tubing is lighter to handle and ship. Three different sizes of sets are offered: 1" diameter, 1½" diameter and 1¾" diameter, all with 5/32-inch wall.

USS National Seamless Tubing helps cut processing costs because it eliminates drilling operations. It enables you to replace drills with simple, less expensive boring tools. And, it reduces tool wear and tool changes.

USS National Seamless Tubing gives you a superior cross section for a part that is designed to withstand equal loading in any direction. It resists bending stresses. It absorbs and localizes shock. And in torsion, it provides a better material distribution, and for a given weight, can withstand more load than other sections.

There's a National Tube Distributor located near you. He's expertly trained in solving all types of tubing problems. So, if you'd like to learn how USS National Seamless Steel Mechanical Tubing can be applied to your designs, see him . . . soon!

USS and National are registered trademarks

**Customer's name supplied on request.*

The world's largest and most experienced manufacturer of tubular products

National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Supply Division · United States Steel Export Company, New York